Ricardian Non-Equivalence*

Martin Eichenbaum† Joao Guerreiro‡ Jana Obradović§

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Abstract

We survey 6,000 U.S. individuals and find that most do not account for the future tax implications of government transfers in their spending plans. To explain this behavior, we develop a theory of bounded rationality in which consumers have limited foresight about future taxes and embed this theory into a Heterogeneous-Agent New Keynesian (HANK) model. We calibrate the model using data from our survey. Our quantitative results indicate that this form of bounded rationality substantially amplifies the effects of fiscal transfers and government spending on output, relative to a model in which individuals have full information and rational expectations.

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†Northwestern University and NBER; eich@northwestern.edu.

‡UCLA; jguerreiro@econ.ucla.edu.

§Northwestern University; janaobradovic2027@u.northwestern.edu.

1 Introduction

How do fiscal deficits affect the economy? According to Ricardian Equivalence, changes in fiscal deficits do not impact economic activity (Ricardo, 1817; Barro, 1974). The reason is that people save in anticipation of future higher taxes, so aggregate demand is unaffected by fiscal transfers. Ricardian Equivalence holds in workhorse New-Keynesian models (e.g., Woodford, 2003, Galí, 2008, and Christiano, Eichenbaum, and Evans, 2005). Although Ricardian Equivalence is a useful theoretical benchmark, numerous empirical and institutional considerations provide compelling grounds for its violation in practice. Examples include distortionary taxation (e.g., Barro 1979), finite lives (e.g., Diamond, 1965; Blanchard, 1985; Poterba and Summers, 1987), and liquidity constraints (e.g, Hubbard and Judd, 1986; Bernheim, 1987).[1]

David Ricardo himself rejected the Ricardian Equivalence proposition on the grounds that people do not incorporate changes in future tax liabilities arising from government transfers into their decisions. For example, David Ricardo writes:

> *"...but the people who pay the taxes never so estimate them, and therefore do not manage their private affairs accordingly. We are too apt to think, that the war is burdensome only in proportion to what we are at the moment called to pay for it in taxes, without reflecting on the probable duration of such taxes."*
>
> David Ricardo in Essay on the Funding System

This paper studies *Ricardian Non-Equivalence* (RNE), i.e., the failure of Ricardian Equivalence due to failure to internalize the impact of future taxes in their decisions fully.[2] We proceed in three steps. First, we design and implement survey experiments to measure how people respond to government transfers and the degree to which they incorporate future tax liabilities into their decisions. Our results provide strong support for the RNE view. Second, we develop a model that is consistent with those empirical results. The model's key feature is that people's spending responses to government transfers reflect sparsity (see Gabaix, 2014). The key property of sparsity is that people work with a simplified model of the world that takes into account only the variables that are most relevant to their decisions. In our context, sparsity means that people do not fully incorporate future tax liabilities into their spending decisions. So, people consume a higher fraction of

[1] Elmendorf and Mankiw (1999) review various reasons for the failure of Ricardian Equivalence. For recent empirical evidence on the impact of deficits on output and inflation see Barro and Bianchi (2024) and Hazell and Hobler (2024).

[2] O'Driscoll Jr (1977) points out that David Ricardo rejected the proposition that public debt and taxation are equivalent. See also Barro (1996) for an interpretation of the discussion in Ricardo (1817).

a government transfer than they would under full information and rational expectations (FIRE). In Barro (1974)'s terminology, people act as if government bonds are net wealth.

In the third step of our analysis, we develop a quantitative GE model to study the macroeconomic implications of RNE. We calibrate the model to moments derived from our survey experiments. The model implies that RNE amplifies the effect of government transfers and government spending on output. This effect is particularly strong in environments where MPCs are high. So, there is an important complementarity between RNE and key features of Heterogeneous-Agent New Keynesian (HANK) models.

We now elaborate on the three steps in our analysis.

Survey results Section 2 discusses the results of a survey that we conducted from December 2024 to February 2025. We surveyed a representative sample of 6,000 U.S. working-age people. A key finding is that almost two-thirds of people spend little time and effort gathering news about the current macro and fiscal conditions. Moreover, people grossly underestimate the size of the U.S. fiscal debt.

We use survey experiments to estimate households' consumption response from a hypothetical monetary transfer from the government using the survey methodology developed by Colarieti, Mei, and Stantcheva (2024).[3] Respondents are randomly assigned to one of three scenarios: (1) they receive an idiosyncratic $1,400 tax rebate that, has no aggregate fiscal implications by design. (2) A universal $1,400 transfer to all U.S. households that gives rise to an increase in government deficits. These payments have future tax implications, but we do not explicitly alert people to that fact. (3) The same universal transfer as (2) coupled with the information that future taxes will rise to offset the current deficit.

We find that the mean, the median, and the entire cross-sectional distributions of MPCs are essentially the same in scenarios (1) and (2). This finding indicates that people do not incorporate the implications of future taxes into their current spending decisions. However, when we inform people about future taxes (scenario (3)), there is a significant reduction in the average and median MPC out of the government transfer. In addition, there is a significant increase in the mass of people who save the entire government transfer. But even then, only roughly 45 percent of people would save the whole transfer. So, Ricardian Equivalence would not hold.

Finally, we elicit people's expectations of future tax liabilities over multiple horizons (one, two, and six years ahead). We find that people's expectations in scenarios (1) and (2) are essentially the same. In scenario (3) we find that people partially adjust their

[3]These authors argue that survey-predicted MPCs are a reliable estimate of actual observed actions.

expectations of future taxes upwards over multiple horizons.

Taken together, these findings support the view that, because of sparsity, people do not naturally incorporate the future tax implications of aggregate transfers into their decisions.

Theoretical results In section 4, we explore the aggregate consequences of RNE in an analytical New Keynesian (NK) model. Our analysis builds on the overlapping generations HANK model developed by Angeletos, Lian, and Wolf (2024a,b). That model provides a tractable approach for generating MPCs out of government transfers that are larger than those implied by the standard Representative-Agent New Keynesian (RANK) model. We extend this framework to incorporate sparsity into people's decision-making process. In our GE model, sparsity has two key effects: (i) it leads to RNE, and (ii) it attenuates general-equilibrium (GE) feedback mechanisms.[4] We use our model to analyze the aggregate effects of a government transfer to all people in the economy.

Our key theoretical result decomposes the output transfer multiplier into three distinct components: (i) the rational-expectations multiplier, (ii) the RNE multiplier, and (iii) a GE dampening factor. Three separate forces are at play in this decomposition. First, in the HANK-OLG model, Ricardian Equivalence fails to hold even under FIRE because agents discount the future more heavily than in the RANK model. So, even if agents were entirely rational, government transfers would stimulate aggregate demand and increase output. Second, RNE generates an additional boost to aggregate demand. Finally, sparsity also affects the extent to which people incorporate GE changes to key variables such as their income and real interest rates. We refer to this effect as the GE dampening factor. While RNE always increases the transfer multipliers relative to the FIRE benchmark, the overall impact of sparsity depends on the quantitative magnitudes of RNE and the GE dampening factor.[5]

The magnitude of the RNE multiplier is critically dependent on the size of the MPC. In a RANK framework, RNE induces a positive transfer multiplier. However, its quantitative impact on current aggregate demand is small because people want to smooth the increase in consumption over time stemming from the perceived increase in wealth. In a HANK model, RNE has a large impact on aggregate demand, because people have large MPCs. So, there is an important positive interaction between RNE and HANK: higher MPCs enhance the amplification effects of RNE. That leads to a larger response in aggre-

[4]The impact of bounded rationality on GE mechanisms has been extensively studied in the literature, see Angeletos and Lian (2023) for a review.

[5]This result is consistent with the discussion in Eichnebaum (Forthcoming) about the conflicting implications of bounded rationality for the efficacy of fiscal policy.

gate activity from a fiscal transfer.

Quantitative Results To assess the quantitative magnitude of RNE on the effects of government transfers and increases in government spending, we extend a standard HANK to incorporate sparsity. We use our survey results to directly inform our choice of the key parameters in the model governing sparsity. Our calibrated model implies that sparsity substantially increases the multipliers associated with increases in government transfers and spending.

In our HANK model, the first-year transfer multiplier under FIRE is 0.22, while under sparsity, that multiplier is 0.33. This increase is mainly driven by people's failure to incorporate tax increases into their current decisions, i.e., the RNE multiplier. The GE-dampening term has a quantitatively small effect on the overall multiplier under sparsity due to offsetting forces coming from inattention to income versus inattention to real interest rates.

The government-spending multiplier under FIRE equals 0.95 in the first year, implying that consumption *falls* after the shock. In contrast, under sparsity, the multiplier equals 1.21, implying that consumption *rises* after the increase in government spending. As in the case of the transfer policy, the increase reflects the fact that people do not incorporate the implied rise in tax liabilities into their current spending decisions.

1.1 Related literature

This paper contributes to the literature on the economic effects of fiscal deficits that depart from the Ricardian Equivalence theorem. Unlike prior work, we focus on departures driven by individuals' failure to incorporate future tax burdens into current spending decisions. In this dimension, our paper is closest to Gabaix (2020), Woodford and Xie (2022), and Bianchi-Vimercati, Eichenbaum, and Guerreiro (2024), who model limited foresight or limited understanding of the government budget constraint as a source of RNE. Our key theoretical contribution is to extend this analysis beyond the RANK framework, demonstrating the interaction between agent heterogeneity and bounded rationality in amplifying the transfer multiplier. This insight is reminiscent of the complementarity results in Farhi and Werning (2019) and Angeletos and Huo (2021). However, note that their results pertain to the degree of GE dampening in response to shocks, whereas our results emphasize a source of extra sensitivity of aggregate demand to transfers due to bounded rationality.

Our approach to deviations from FIRE builds on the literature on inattention (e.g.,

Sims 2003, Gabaix 2014, 2019, 2020, Maćkowiak, Matějka, and Wiederholt 2023). Our modeling approach is most closely related to the concept of sparsity developed by Gabaix (2014, 2019, 2023). We argue that our empirical results strongly support the hypothesis of source-dependent inattention, which is central to the sparsity framework. In contrast, rational-inattention models in the Sims (2003) tradition would not lead to because the spending response to current transfers and future taxes would be equally dampened. While we model deviations from FIRE with inattention, our main results would hold under alternative models of bounded rationality such as level-k thinking (e.g., Farhi and Werning, 2019, Farhi, Petri, and Werning, 2020, Bianchi-Vimercati, Eichenbaum, and Guerreiro, 2024, and Mei and Wu, 2024), reflective expectations (e.g., García-Schmidt and Woodford, 2019), limited foresight (e.g., Woodford, 2019 and Woodford and Xie, 2019, 2022), among others.[6]

By studying the effects of fiscal transfers in a HANK model under sparsity, we contribute to the broader literature on heterogeneous-agent models with bounded rationality. Farhi and Werning (2019) and Farhi, Petri, and Werning (2020) study the transmission of monetary and government spending policies in HANK economies when people are level-k thinkers. Angeletos and Huo (2021) show how HANK features exacerbate the consequences of incomplete information and lack of common knowledge on equilibrium dynamics. Auclert, Rognlie, and Straub (2020) and Pfäuti and Seyrich (2022) study HANK models with sticky expectations and cognitive discounting, respectively, focusing on the implications of monetary policy transmission. Bardóczy and Guerreiro (2023) develop a HANK model with search and matching frictions and study the impact of unemployment benefits on economic activity, taking expectations directly from the data. Guerreiro (2023) studies the effect of heterogeneous beliefs in HANK economies for a large set of shocks.

Empirically, our paper contributes to the growing use of survey data to quantify behavioral mechanisms in macroeconomic models (Roth and Wohlfart, 2020, Coibion et al., 2022, 2023, and Stantcheva, 2023). In particular, our measurement of the MPC builds directly on Colarieti, Mei, and Stantcheva (2024) and follows a broader literature estimating MPCs via surveys (Shapiro and Slemrod, 2003; Jappelli and Pistaferri, 2014, Bunn, Le Roux, Reinold, and Surico, 2018, Christelis, Georgarakos, Jappelli, Pistaferri, and Van Rooij, 2019, Parker and Souleles, 2019, Fuster, Kaplan, and Zafar, 2021, Andre, Flynn, Nikolakoudis, and Sastry, 2025). Our paper explicitly estimates propensities to spend out of idiosyncratic and universal transfers to assess behavioral responses to the implicit future tax burden of fiscal deficits.

[6] Angeletos and Lian (2017) review recent developments in this literature, highlighting the key commonalities across different models.

Outline The paper is organized as follows. Section 2 discusses the design of the survey. Section 3 begins by discussing the conceptual framework behind the result and then discusses the empirical findings of our survey experiments. Section 4 presents the general equilibrium (GE) model model and derives the theoretical results. Section 5 describes the quantitative model and the calibration, and sections 6 and 7 quantify the contribution of RNE to the overall government transfer and spending multipliers, respectively. Finally, section 8 concludes. The Appendix contains proofs, additional analyses, and the survey questionnaire.

2 Survey design

We implement an online survey to understand how people obtain information and reason about the future tax consequences of fiscal deficits. The survey was conducted via Prolific between December of 2024 and February of 2025. We collected a total of 6,000 responses. Participation in the survey was limited to individuals between 22 and 65 years old. To ensure that the sample is representative of the US population, we impose sample targets based on gender, education, and political affiliation. Gender and education targets were computed using data from the November 2024 Current Population Survey.[7] Political affiliation targets were computed based on Gallup data for October 2024. On average, participants took 9 minutes to complete the survey and were compensated at an average rate of $1.80, corresponding to an hourly rate of $12.

Appendix Table A.1 compares the characteristics of our sample with the broader US population. Our sample is fairly representative of the US population, albeit with a slight over-representation of younger and unemployed households. Our sample also slightly under-represents white individuals.

Our survey is mainly composed of closed-ended questions. But, following best practices, we generally include an option "Other" and a box to allow for open-ended answers (Stantcheva, 2023). As discussed before, our main evidence on propensities to spend comes from randomly assigning respondents to one of three hypothetical scenarios: (1) the benchmark case in which people receive an idiosyncratic tax rebate of $1,400, which has no aggregate fiscal implications; (2) a universal $1,400 transfer to all U.S. households, introducing GE effects; and (3) the same universal transfer, but respondents are informed

[7] We access ASEC-CPS data from the IPUMS CPS database Flood, King, Rodgers, Ruggles, Warren, Backman, Chen, Cooper, Richards, Schouweiler, and Westberry (2023).

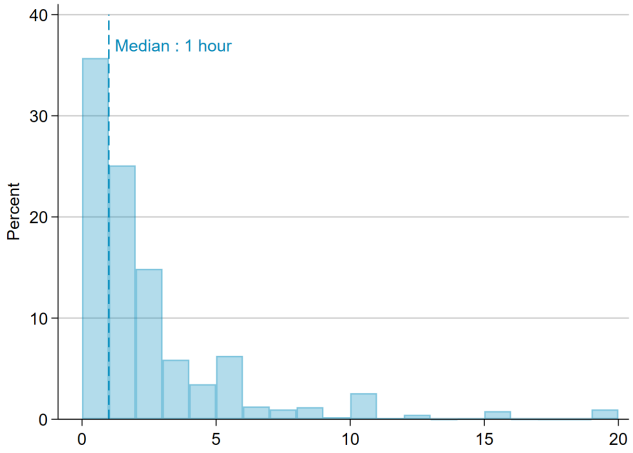
of a future tax increase.[8]

In preliminary testing of our survey, we also experimented with scenarios that replicate the idiosyncratic transfers of scenario 1 but where the transfer came from a source other than the government (for example, winning the lottery). We found little or no difference between the responses to those questions and the responses in scenario 1. So, we excluded the non-government transfer scenario. Appendix E contains the full questionnaire.

2.1 How well-informed are people about general economic conditions?

We now discuss evidence from our survey on how informed people are about aggregate economic conditions and the government's fiscal position.

Figure 2.1: Time Spent Acquiring Information



Notes: This figure depicts the distribution of weekly time allocated to gathering information about the U.S. economy, based on survey responses to the question: "How many hours per week do you typically spend gathering information about the U.S. economy?" The data have been truncated to exclude values below 0 and above 20 hours to ensure a more interpretable range. The median number of hours spent acquiring economic information is indicated within the distribution.

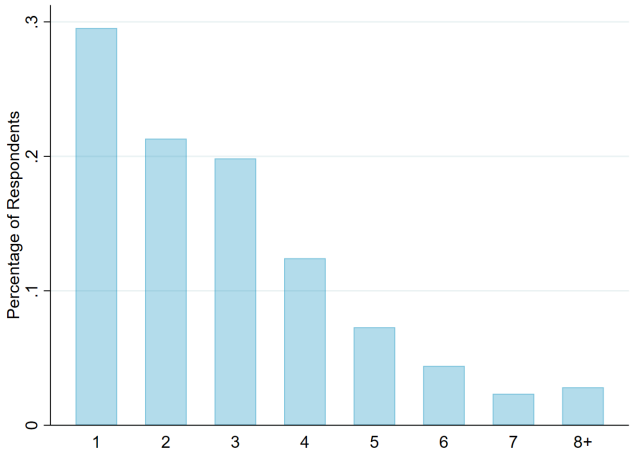
(1) People spend little time obtaining information about the US fiscal situation We asked respondents how many hours per week they usually spend gathering information about the US economy. Figure 2.1 shows the distribution of the responses. The median

[8] In the Appendix Table A.2 we show the distribution of characteristics for the sub-samples receiving each treatment. There are no meaningful differences across these three groups.

number of hours a week spent acquiring information is 1 hour. Over 70 percent of respondents say they spend less than 2 hours a week gathering news.

(2) People rely on a small number of information sources We asked respondents to quantify the number and types of sources from which they usually obtain information about the US economy. Figure 2.2 shows the distribution of the number of sources our survey respondents use. The median person obtains information from fewer than two sources. Almost 30 percent use exclusively a single source of information.

Figure 2.2: Number of Sources Used



Notes: This figure presents the histogram of the number of sources used by survey respondents to obtain news about the U.S. economy, based on responses to the question: "What are your sources of news about the U.S. economy?" The figure captures the total number of sources selected by each respondent from a predefined set of options.

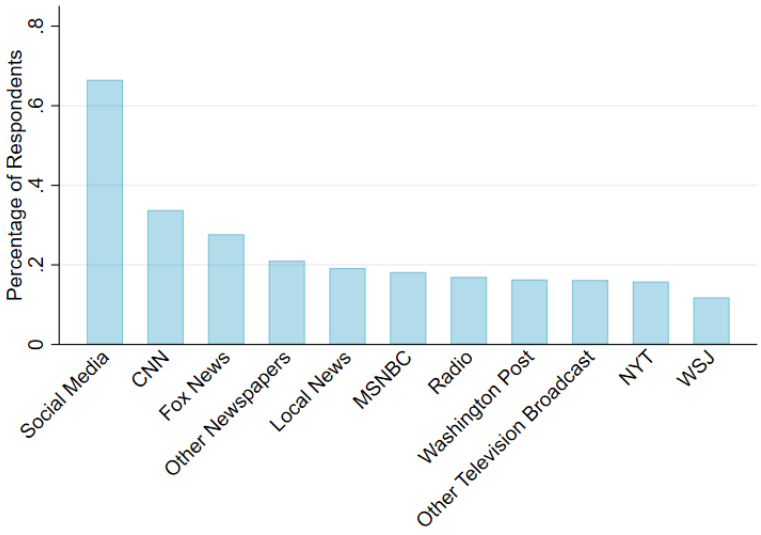
Figure 2.3 shows the types of sources from which survey respondents obtain information about the US economy. Strikingly, we find that 70 percent of people report obtaining news from social media (X plus other social media). Social media is followed by the two major cable news channels, CNN and Fox News.

(3) People misperceive the current US fiscal situation We directly elicit people's perceptions of the US fiscal situation. We ask respondents about their views of three key fiscal indicators for the year 2023: (i) the federal-spending to GDP ratio, (ii) the tax-revenue to GDP ratio, and (iii) the federal-debt to GDP ratio. Figure 2.4 panels A, B, and C display the distribution of perceptions about federal spending, taxes, and debt, respectively.[9]

Across all measures, we see a large dispersion of perceptions as most people make significant mistakes in predicting these fiscal indicators. Surprisingly, the median person

[9] Appendix Figure B.1 also displays the respondents' perceptions of the US inflation target.

Figure 2.3: Types of Sources Used



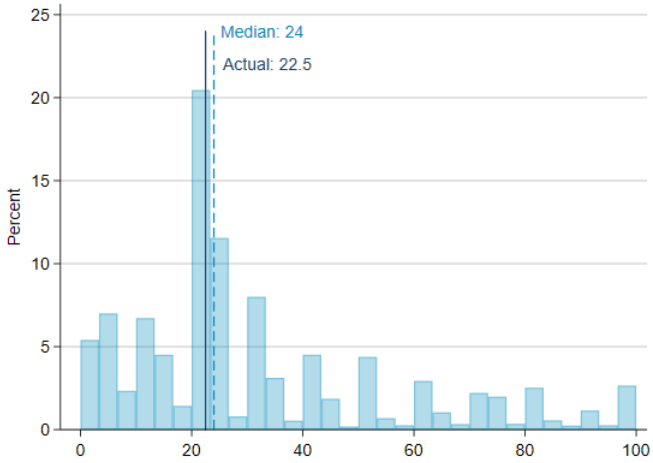
Notes: This figure illustrates the distribution of responses to the question: "What are your sources of news about the U.S. economy?" It displays the percentage of respondents who selected each source from a pre-defined set of options.

only slightly overestimates federal spending and underestimates tax revenue. In contrast, the average response is substantially higher than the actual value of both indicators. The average person thought that the ratio of federal spending to GDP and tax-revenue to GDP ratio was 35.3 percent and 22.5 percent, respectively. The actual values are 22.5 and 16.2 percent, respectively.

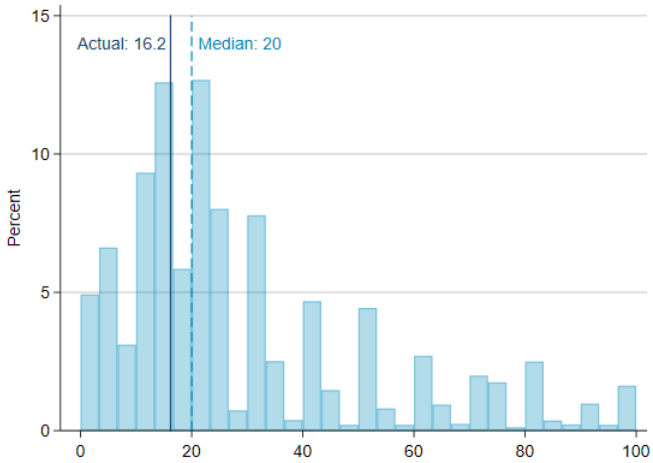
The vast majority of people grossly underestimate the size of the federal debt. The median and average person reports that the ratio of federal debt to GDP is 65 percent and 75.4 percent, respectively. In reality, that fraction is equal to 126 percent. Only about 13.8 percent of respondents think the ratio of federal debt to GDP is equal to or greater than its actual level.

Figure 2.4: People's Perceptions of the US Fiscal Situation

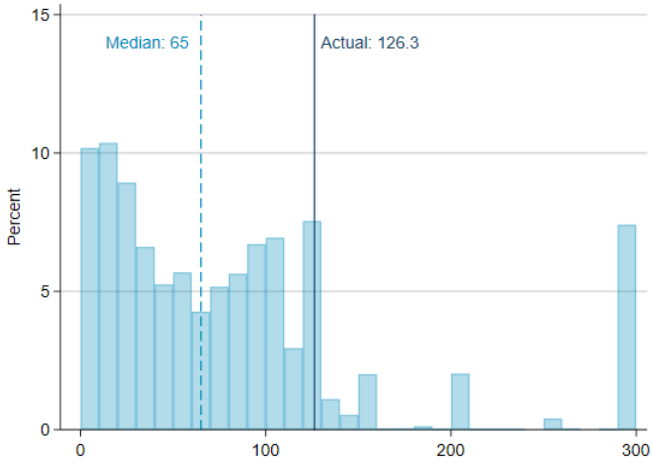
Panel A: Federal Spending



Panel B: Federal Taxes



Panel C: Federal Debt



Notes: This figure presents the distribution of responses to three survey questions regarding the U.S. fiscal situation, in which respondents were asked to estimate federal spending, tax revenue, and federal debt as percentages of Gross Domestic Product (GDP) in 2023. Panel A displays responses to the question: "What do you think federal spending was, as a percentage of GDP, in 2023?" Panel B presents responses to the question: "What do you think tax revenue was, as a percentage of GDP, in 2023?" Panel C illustrates responses to the question: "What do you think federal debt was, as a percentage of GDP, in 2023?" To enhance interpretability, the data have been truncated, excluding values above 100 percent for federal spending and tax revenue and above 300 percent for federal debt. The median estimates provided by respondents are indicated with dashed lines, while the actual values are represented by solid lines.

3 Survey Results: Ricardian Non-Equivalence

In this section, we report the results of our survey regarding the extent to which individuals account for the future fiscal implications of government deficits when making consumption decisions. Specifically, we leverage our survey data to estimate individuals' MPC in response to a cash transfer under three distinct hypothetical scenarios: (i) an individual cash transfer, (ii) a universal transfer distributed to all households in the U.S. economy, and (iii) a universal transfer accompanied by explicit information that there will future tax increases to offset the current fiscal deficit.

Before presenting our empirical findings, it is instructive to outline the conceptual framework that underpins our empirical strategy. This discussion clarifies the economic mechanisms at play and provides a theoretical foundation for interpreting our results.

3.1 A Simple Model of Ricardian Non-Equivalence

Consumers live for two periods $t \in \{0, 1\}$. In each period, they consume C_t and obtain income Y_t. To focus on the problem of inattention to taxes, we assume that the household faces no uncertainty about their income stream.

Consumers face a standard intertemporal consumption-savings problem, seeking to maximize the expected present discounted value of utility from consumption:

$$E_0 \left[u\left(C_0\right) + \beta u\left(C_1\right) \right], \tag{3.1}$$

where $\beta \in (0, 1)$ is the subjective discount factor, $u\left(C\right)$ is increasing, concave, and twice continuously differentiable, and $E_0\left[\cdot\right]$ denotes the household's expectations. The household budget constraints are given by

$$C_0 + \frac{B}{R} = Y_0 - T_0, \tag{3.2}$$

$$C_1 = Y_1 - T_1 + B, \tag{3.3}$$

where R denotes the real interest rate, and T_0 and T_1 denote the taxes (or transfers if negative) at time 0 and 1, respectively. The household receives an additional transfer ε_0 at time 0 and must forecast the taxes that must to pay at time 1 for the government budget constraint to hold. We summarize the impact of the transfer policy on aggregate demand

by the consumption response out of the transfer:

$$\mathbb{M} \equiv \frac{dC_0}{d\varepsilon_0}|_{\varepsilon_0=0}. \tag{3.4}$$

Consumer Behavior under FIRE Consider a consumer who observes the current transfer T_0 and has rational expectations about the future taxes T_1. To a first-order approximation (around the point $\varepsilon_0 = 0$), household consumption is given by

$$c_0^* = m_0\varepsilon_0 - m_1 t_1, \tag{3.5}$$

where $c_0^* = C_0^* - \overline{C}_0$, where $\overline{C}_{i,t}$ is the optimal consumption with $\varepsilon_0 = 0$, and $t_t = dT_t$. In the appendix, we provide formulae for the intertemporal marginal propensities to consume, m_t. As in Auclert, Rognlie, and Straub (2024), these terms summarize the individual's time-0 spending response to an additional unit of income at time t. Using this expression, we can write the response of consumption to the transfer as:

$$\mathbb{M}^* = m_0 - m_1 \frac{dt_1}{d\varepsilon_0}.$$

The response of aggregate demand today is summarized by two terms. The first term,m_0, captures how much of the current transfer the household consumes, holding future taxes constant. Households are forward-looking so they understand that the current transfer will be taxed back tomorrow. As a result, they adjust their spending today (save) in anticipation of future taxes, an effect that is captured by the term $m_1 \frac{dt_1}{d\varepsilon_0}$.

Theorem 1 (Ricardian Equivalence Theorem)**.** *The intertemporal marginal propensities to consume satisfy*

$$m_1 = \frac{m_0}{R}.$$

Suppose households and the government face the same real interest rate. Then

$$\mathbb{M}^* = m_0 - m_1 \frac{dt_1}{d\varepsilon_0} = m_0 - m_1 R = 0.$$

In sum, Ricardian Equivalence holds in this simple model if households have rational expectations.

Consumer Behavior under sparsity Let the households be given by:

$$V \equiv \max E_0 \left[u\left(C_0\right) + \beta u\left(Y_1 - T_1 + R\left(Y_0 - T_0 - C_0\right)\right)\right], \tag{3.6}$$

and let V^* denote the value function under full information and rational expectations. We can prove the following result.

Lemma 1. *Let $\mathbb{L} \equiv \mathbb{E}_- [V^* - V]$ denote the consumer's ex-ante expected losses from inattention. The quadratic approximation of the loss function around $\varepsilon_0 = 0$ is given by:*

$$\mathbb{L} = \frac{\widetilde{\sigma}}{2} \mathbb{E}_- \left[(c_0^* - E_0 c_0^*)^2 \right], \tag{3.7}$$

where $\widetilde{\sigma} > 0$ is a constant term.

When choosing their optimal level of attention, the consumer seeks to minimize the losses from inattention given by (3.7) plus the cognitive costs of attention. We model attention following the sparsity model of Gabaix 2014. In this model, person i's beliefs about future taxes are, respectively, given by

$$E_0 [t_1] = (1 - \lambda) t_1,$$

where $\lambda \in [0, 1]$ denote the attention parameter. As $\lambda \to 0$ individual behavior converges to the FIRE benchmark. As $\lambda \to 1$ the shocks don't affect individual behavior since the person "does not pay attention." The individual chooses the optimal levels of attention to minimize $\mathbb{L} + \mathcal{C}(\lambda)$, where the cognitive cost of attention $\mathcal{C} : [0, 1] \to \mathbb{R}_+$ is decreasing in λ and continuously differentiable. For simplicity, we assume that $\mathcal{C}(\lambda) = \kappa (1 - \lambda)$ for $\kappa \geq 0$. We also assume that the household costlessly observes ε_0. So, as in our survey experiments, respondents have precise information about the current transfer. Households do have to forecast future taxes t_1.

Analogous to Gabaix 2014, we suppose that, before the realization of taxes, people think t_1 is a random variable with mean 0 and variance σ^2.

Proposition 1. *The losses from inattention are given by*

$$\mathbb{L} = \frac{\psi}{2} \lambda^2 m_1^2 \sigma^2, \tag{3.8}$$

and the optimal level of attention is given by

$$\lambda = \min \left\{ \frac{\kappa}{\psi m_1^2 \sigma^2}, 1 \right\}. \tag{3.9}$$

Consumer i's spending is given by

$$\frac{dc_0}{d\varepsilon_0} = m_0 - m_1 (1 - \lambda) \frac{dt_1}{d\varepsilon_0}.$$

Furthermore, the aggregate MPC out of a government transfer is given by:

$$\mathbb{M} = m_0 \lambda$$

Proposition 1 establishes that sparsity attenuates the household's spending response to future taxes. The MPC differs from its value under FIRE by

$$\mathbb{M} - \mathbb{M}^* = m_0 \lambda > 0.$$

Under FIRE, $\lambda = 0$ and $\mathbb{M} - \mathbb{M}^* = 0$. Under sparsity, $\lambda > 0$, and the response of aggregate spending to a transfer is higher than under FIRE. Because individuals do not fully internalize the impact of transfers on on future taxes, Ricardian Equivalence does not hold.

Discussion We model inattention following the sparsity approach of Gabaix (2014, 2019). An alternative model of inattention follows the rational-inattention approach of Sims (2003). A key difference between these two approaches is that people work with a simplified model under sparsity and don't understand the government budget constraint. Under rational inattention, people fully understand the economy's structure, including the government budget. It follows that, in a rational inattention model, Ricardian Equivalence holds. We prove this result formally in Appendix C.3

3.2 Estimating the MPC out of transfers

This subsection presents our survey results regarding people's MPC in the three transfer scenarios discussed above.[10]

In the first hypothetical scenario, *Treatment 1* (T1), respondents are asked to envision their household receiving an unexpected cash transfer of $1,400 from the government. They are explicitly informed that they are the sole recipients of this transfer. The objective of Treatment 1 is to estimate the MPC out of a typical cash transfer that doesn't have broader fiscal implications. Formally, we use Treatment 1 to estimate m_0. In preliminary

[10] In Appendix Table A.2 we show the distribution of characteristics for the sub-samples receiving each treatment. There are no meaningful differences across these three groups.

versions of our survey, we experimented with alternative scenarios in which the cash transfer was framed as originating from a lottery win. The results indicated no significant differences in the estimated MPC across these variations, suggesting that the framing of the transfer does not materially affect consumption responses. The wording of Treatment 1 is given by:

Treatment 1:
In this scenario, your household receives a one-time unexpected cash transfer of $1,400 from the government today. You know that no other household will receive such a payment. We are interested in understanding how you would use this additional cash.

In *Treatment 2* (T2), respondents are told that their household receives an unexpected cash transfer of $1,400 as part of a new policy that distributes a one-time transfer to *every* household in the United States. Treatment 2 allows us to estimate the spending response in the presence of sparsity in decision-making. The wording of Treatment 2 is given by:

Treatment 2:
In this scenario, the government sends a one-time unexpected cash transfer of $1,400 to every household in the USA today, including yours. We are interested in understanding how you would use this additional cash.

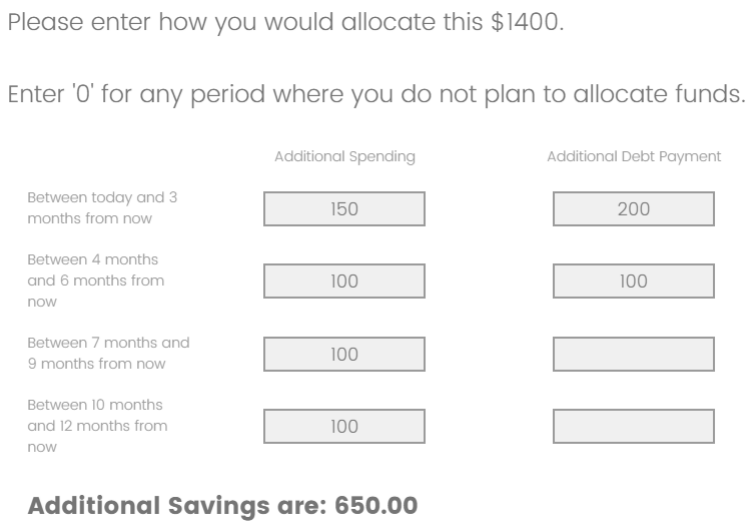
Treatment 3 (T3) closely mirrors T2 with one important difference: respondents are informed that the government will raise taxes in the following year to offset the current fiscal deficit. By explicitly providing households with information about the future path of taxation, this experiment reduces the cognitive burden associated with forecasting the fiscal consequences of government transfers. Treatment 3 allows us to assess whether directly informing people about future tax adjustments alters their spending response relative to Treatment 2. The wording of Treatment 3 is given by:

Treatment 3:
In this scenario, the government sends a one-time unexpected cash transfer of $1,400 to every household in the USA today, including yours. To finance this deficit, the government will raise your taxes by $1,400 next year. We want to understand how you would use the $1,400 transfer today.

We follow the methodology developed by Colarieti et al. (2024) to address the challenges associated with eliciting spending responses in a survey setting. The approach consists of three key components. First, we provide clear definitions of spending, debt payments, and savings to ensure a consistent understanding among respondents. Second, we explicitly state the reported use of the cash transfer should be in addition to the

individuals' pre-existing plans. Finally, we employ the interactive matrix design of Colarieti et al. (2024) to reduce the computational complexity faced by respondents when allocating their cash transfers.

Figure 3.1: Interactive Matrix Design

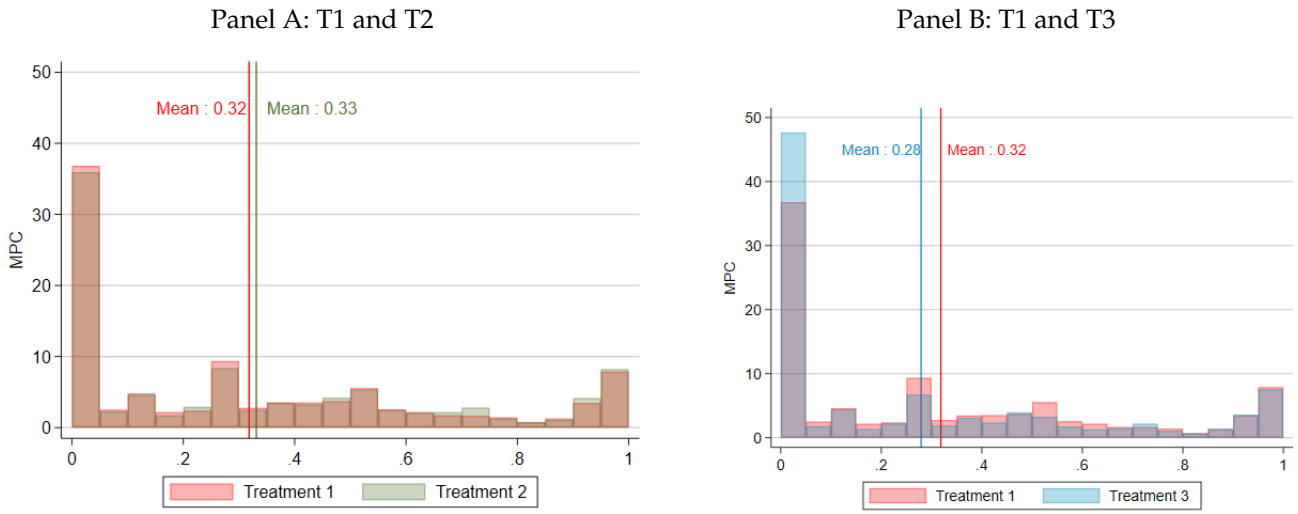


Notes: This figure illustrates the interactive matrix design implemented in the survey, which enables respondents to allocate a total of $1,400 across different time periods. Participants can specify amounts for additional spending and additional debt payments in each of the four periods. Any unallocated portion is automatically categorized as additional savings, which is displayed dynamically as respondents input their allocations.

Figure 3.1 depicts the matrix interface used in the survey. Respondents are asked to report their additional spending and debt payment plans for each of the next four quarters. The matrix structure consists of rows corresponding to different time periods: "Between today and 3 months from now", "Between 4 months and 6 months from now", "Between 7 months and 9 months from now", and "Between 10 months and 12 months from now". The columns prompt respondents to specify their additional spending and debt payment allocations. The matrix is interactive, ensuring that any input into these categories dynamically adjusts the remaining amount allocated to additional savings. Following Colarieti et al. (2024), we impose non-negativity constraints on the amounts allocated to each box allowing the total allocation to exceed $1,400, thereby permitting negative additional savings.

We aggregate the additional spending at an annual frequency and define the marginal

Figure 3.2: Distribution of Marginal Propensities to Consume



Notes: The figure presents the distribution of estimated marginal propensities to consume (MPC) across different experimental treatments. We aggregate respondents' spending to an annual frequency. The MPC is computed as total spending divided by $ 1,400. To ensure interpretability, values exceeding one were capped in the graph. Panel A compares Treatment 1 (individual cash transfer) and Treatment 2 (universal cash transfer). Panel B compares Treatment 1 and Treatment 3 (universal cash transfer with information about future taxation). The mean MPC for each treatment is indicated in the figure.

propensity to consume (MPC) for individual i as:

$$\text{MPC}_i \equiv \frac{\sum_{t=0}^{3} (1+r)^{-t} \text{ Additional Spending}_{i,t}}{\$1,400}, \tag{3.10}$$

and set $r = 0.05\%$ such that the annual interest rate is 2%. Figure 3.2 presents the distribution of MPCs in the different scenarios. Panel A compares the distributions of MPCs under T1 and T2, represented in blue and red, respectively. Panel B illustrates the distributions of MPCs under T1 and T3, again using blue and red to differentiate between the two groups.

According to our survey results, people spend $462 out of an individual rebate of $1,400, implying an average MPC equal to 0.33. We find no meaningful differences between the MPCs in the T1 and T2 scenarios. The average MPCs are 0.33 and 0.34 in scenarios T1 and T2, respectively. The small difference between these MPCs is not statistically significant. Moreover, the overall distribution of MPCs remains virtually unchanged across the two treatments. Specifically, the proportion of individuals reporting that they would not spend any portion of the transfer within the first year is 35.8% under T1 and 35.6% under T2. The median MPC for T1 and T2 is 0.286, implying that the

typical respondent spends $400 out of the $1,400 transfer. These findings suggest that the dampening factor is very small, echoing the words of David Ricardo: *"but the people who pay the taxes never so estimate them."*

In Treatment 3 (T3), respondents are provided with explicit information regarding a specific path of future taxes. As shown in Panel B, this additional information leads to a notable reduction in the average MPC. Specifically, the average MPC declines from 0.33 to 0.29, implying a decrease in spending of approximately $60 out of the $1,400 transfer. Moreover, the provision of tax information induces a significant shift in the distribution of MPCs. The proportion of individuals reporting that they would entirely save the transfer increases to 46.7%, while the median MPC declines to 0.14. These findings suggest that individuals become more responsive to anticipated future taxes when the cognitive burden of forecasting these taxes is alleviated. But even with this additional information, Ricardian equivalence does not hold, either because of sparsity or more traditional reasons like liquidity constraints.

Expectations of future taxes To gain further insight into the sources of RNE, we directly elicit respondents' expectations regarding their future tax liabilities. Specifically, we ask individuals to report how they anticipate their household's federal tax payments to evolve over the next year, two years, and six years.[11] The precise wording of the question is as follows:

Eliciting Tax Expectations:
By what percentage do you expect your total household's federal tax payments to change in the following periods?

- *Between Jan 1. 2025 and Dec 31. 2025*
- *Between Jan 1. 2026 and Dec 31. 2026*
- *Between Jan 1. 2030 and Dec 31. 2030*

We elicit individuals' expectations regarding future tax liabilities before and after exposure to the hypothetical scenario. Respondents are explicitly prompted to incorporate any additional impact the hypothetical scenario may have on their tax expectations. These elicited expectations allow us to examine how different treatments influence perceptions

[11] We select six years as a measure of long-run expectations. Given the timing of our survey, this corresponds to the year 2030, allowing for a clear visual distinction from the nearer-term horizons of 2025 and 2026.

of future taxes.[12]

To analyze the effect of each treatment on household expectations, we estimate the following regression model:

$$E_i^{\text{Post}}\left[\Delta t_h\right] = \alpha_h + \gamma_{2,h}\mathcal{I}_{i,2} + \gamma_{3,h}\mathcal{I}_{i,3} + \rho_h E_i^{\text{Pre}}\left[\Delta t_h\right] + \xi_i, \tag{3.11}$$

where $E_i^{\text{Pre}}\left[\Delta t_h\right]$ and $E_i^{\text{Post}}\left[\Delta t_h\right]$ represent individual i's expectations of tax growth for horizon $h = 1, 2, 6$ before and after being exposed to the hypothetical scenario. The indicator variables $\mathcal{I}_{i,2}$ and $\mathcal{I}_{i,3}$ take the value of 1 if an individual is assigned to Treatment 2 or Treatment 3, respectively, and 0 otherwise.

The regression results are presented graphically in Figure 3.3 and summarized in Appendix Table A.3. As anticipated, Treatments 1 and 2 yield similar patterns of tax expectations. This finding suggests that individuals do not significantly update their expectations of future tax liabilities at any horizon when exposed to a treatment in which the future tax implications of current deficits remain implicit.

In contrast, Treatment 3 (T3) leads to a pronounced upward revision of tax expectations at all horizons except the long run. This finding indicates that providing explicit information about future taxation significantly impacts individuals' beliefs about their tax burden. Notably, respondents revise their expected tax liabilities not only for the following year but also for the two-year-ahead horizon, suggesting a broader adjustment in their expectations about the trajectory of fiscal policy.

Expectations about other variables We find that, for the most part, none of the treatments significantly affect individuals' expectations about their income growth or interest rates. However, treatment T3 induces a notable upward revision in expected inflation, particularly at the one-year horizon where expected inflation rises by 0.4 percentage points. In contrast, treatment T2 does not have a discernible impact on inflation expectations.

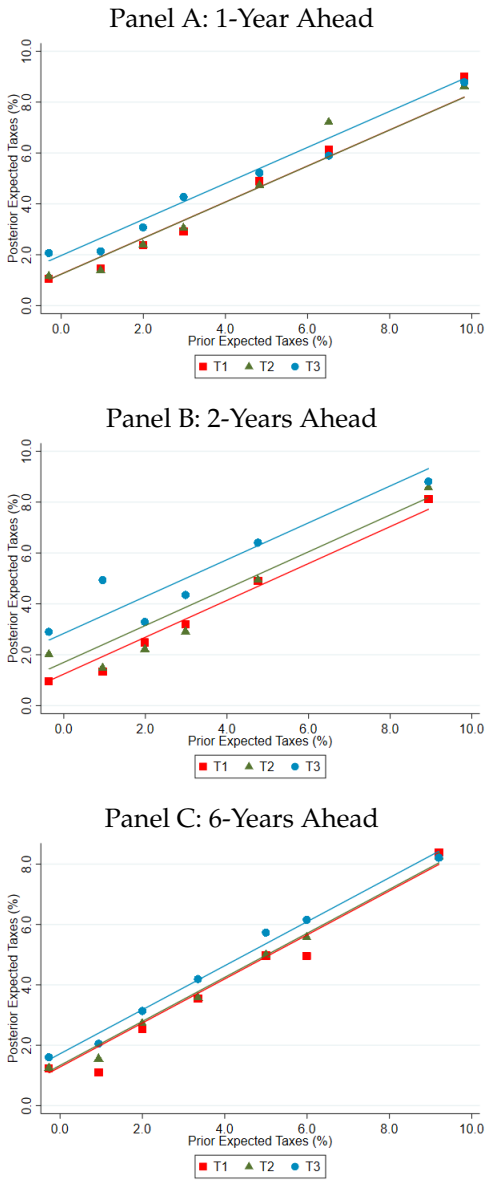
These findings present a challenge for standard theories of fiscally driven inflation, such as the Fiscal Theory of the Price Level (FTPL) and HANK models under FIRE. According to these frameworks, the promise of future tax hikes—as in T3—should lead to lower, rather than higher, inflation expectations.[13,14]

[12] In addition to tax expectations, we similarly elicit respondents' expectations regarding income growth, interest rates, and inflation. The results for these alternative expectations are presented in the Appendix Table A.4 for income expectations, A.5 for interest rate expectations, and A.6 for inflation expectations.

[13] For a recent review of FTPL, see Cochrane (2023), and for an exploration of the relationship between HANK models and FTPL, see Angeletos et al. (2024b).

[14] One possible explanation for this anomaly is that individuals' forecasts are influenced by selective

Figure 3.3: Expectations of Taxes Before and After Treatment



Notes: This Figure presents the relationship between prior and posterior expected taxes across treatments and at different time horizons. The bin scatter plots were constructed by splitting prior expected taxes into 10 bins and computing the average posterior expected taxes within each bin and treatment. The fitted lines are obtained from the regression specified in equation (3.5). Panel A presents responses for 1 year ahead, Panel B for 2 years ahead, and Panel C for 6 years ahead.

4 General-Equilibrium Consequences of Ricardian Non-Equivalence

In this section, we develop a model of and examine the GE consequences of that failure. Specifically, we analyze an overlapping generations (OLG) economy populated by perpetual youths who make spending decisions subject to sparsity constraints.[15] Our model builds most directly on the HANK-OLG framework of Angeletos et al. (2024a,b), which we extend to incorporate sparsity in decision making.

Firms and production Firms produce the final consumption good using a linear technology with labor as the sole input:

$$Y_t = N_t. \tag{4.1}$$

The aggregate labor input N_t is a composite of a continuum of differentiated labor varieties indexed by $u \in [0,1]$. Individual labor inputs produce N_t using the CES production function:

$$N_t = \left[\int_0^1 N_{u,t}^{\frac{\theta-1}{\theta}} du\right]^{\frac{\theta}{\theta-1}}. \tag{4.2}$$

Here $\theta > 1$ represents the elasticity of substitution across labor varieties.

A representative firm operates in perfectly competitive goods and labor markets. The firm maximizes profits given by $P_t Y_t - \int_0^1 W_{u,t} N_{u,t} du$ subject to the production technology (4.2). Here, P_t denotes the price of the consumption good, and $W_{u,t}$ represents the wage associated with labor variety u. Profit maximization implies that the demand for $N_{u,t}$ is given by

$$N_{u,t} = \left(\frac{W_{u,t}}{W_t}\right)^{-\theta} N_t, \tag{4.3}$$

where the aggregate wage index is given by $W_t = \left[\int_0^1 W_{u,t}^{1-\theta} du\right]^{\frac{1}{1-\theta}}$ and $W_t = P_t$.

Households There is a continuum of households indexed by $i \in [0,1]$. Each household consists of a continuum of worker types. Each household survives from one period to the next with probability $\omega \in (0,1]$. Upon death, a household is replaced by a newborn

recall driven by affective associations, as proposed by Taubinsky, Butera, Saccarola, and Lian (2024). In our context, the additional negative news embedded in the explicit tax information provided in T3 may lead individuals to adopt a more pessimistic outlook about future inflation. Investigating this potential mechanism lies beyond the scope of this paper.

[15] It is well known that perpetual youth models can provide a good approximation of quantitative HANK models where some people face a binding borrowing constraint (seeWoodford (1990), Farhi and Werning (2019), and Angeletos et al. (2024a,b)).

household. Household i's lifetime utility function is given by:

$$\mathcal{U}_{i,t} = E_t \sum_{h=0}^{\infty} (\beta\omega)^h \left[u\left(C_{i,t+h}\right) - v\left(N_{t+h}\right) \right]. \tag{4.4}$$

Here $C_{i,t}$ represents the consumption of household i at time t, N denotes labor supply, and $\beta \in (0,1)$ denotes the household's subjective discount factor. $E_t[\cdot]$ denotes the household's conditional expectations operator, which need not coincide with FIRE.

Households can purchase actuarially fair annuities. Conditional on survival, household i receives a return of R_t/ω on their savings $A_{i,t}$, where R_t is the interest rate on government debt. Aggregate labor supply is given by $N_t = \int N_{u,t} du$. We assume that $N_{u,t}$ is determined by a monopolistically competitive labor union, which sets the labor supply of worker type u to be the same for all u.

Household $i's$ budget constraint is given by

$$C_{i,t} + A_{i,t+1} = Y_t + \frac{R_t}{\omega} A_{i,t} - T_t + S_{i,t}, \tag{4.5}$$

where $Y_t = \int W_{u,t} N_{u,t} du$.The presence of ω 4.5 reflects risk sharing by households of mortality risk via annuities. The variable B denotes the steady-state level of government debt. As in Angeletos et al. (2024a), the variable $S_{i,t}$ is a transfer from a social security fund to newborn households, i.e., $S_{i,t} = B > 0$ if the household has just been born or $S_{i,t} = -\frac{1-\omega}{\omega} B < 0$ for an old household. These transfers ensure that the steady state of the economy is independent of ω and $R = \beta^{-1}$ (see Angeletos et al., 2024a).

Labor market and unions We follow the NK sticky wage literature and assume that the total amount of labor across households supplied by type u workers, $N_{u,t}$, is decided by a monopolistically competitive labor union (see Erceg et al., 2000, Schmitt-Grohé and Uribe, 2005, and Auclert et al., 2024). Unions face a quadratic cost of adjusting nominal wages $\frac{1}{2\widetilde{\kappa}_w} \left(\frac{W_{u,t}}{W_{u,t-1}} - 1 \right)^2$. This cost is measured in units of household utility. At time t, the union chooses a nominal wage $W_{u,t}$ and labor supply $N_{u,t}$ subject to the demand equation 4.3, to maximize households' expected utility. Since all unions are symmetric, they all set the same wage. In the appendix, we show that the linearized wage-NK Phillips curve in this model is given by:

$$\pi_t^w = \kappa_w y_t + \beta \pi_{t+1}^w, \tag{4.6}$$

where $\kappa_w > 0$ is a rigidity parameter that reflects the cost of changing nominal wages and π_t^w denotes wage inflation. In equilibrium $W_t = P_t$, so price inflation equals wage

inflation $\pi_t = \pi_t^w$.

Monetary and fiscal policy The monetary authority sets nominal interest rates i_t (in log deviations). For simplicity, we assume that they follow a rule that places a unit coefficient on future (expected) inflation:

$$i_t = \pi_{t+1}. \tag{4.7}$$

Equivalently, monetary policy keeps the real interest rate constant

$$r_t = 0, \tag{4.8}$$

for all t. We use this simplified real interest rate rule to make the analysis more transparent. We focus on equilibria in which the economy returns to steady state after a shock.

The government flow-of-funds constraint is given by

$$B_{t+1} + T_t = R_t B_t + G, \tag{4.9}$$

where G denotes government purchases, T_t denotes tax revenues from households, and B_t denotes debt at the start of period t. Linearizing the government budget constraint around steady state, we obtain

$$b_{t+1} = \beta^{-1} b_t - t_t. \tag{4.10}$$

Here $b_t = (B_t - B)/Y$. Taxes are given by:

$$t_0 = -\varepsilon_0, \quad \text{and } t_t = \beta^{-1}\tau_b b_t \quad \text{for } t = 1, 2, ... \tag{4.11}$$

where $t_0 = (T_t - T)/Y$. So, the government transfers ε_0 to all households at the initial date and taxes old household in the future. The parameter τ_b controls the speed at which the government pays for the deficit-financed transfers. Using the linearized tax rule, we can write

$$b_1 = \varepsilon_0, \quad \text{and } b_t = \left[\beta^{-1}(1 - \tau_b)\right]^{t-1} \varepsilon_0, \quad \text{for } t = 2, 3, ...$$

It follows that:

$$b_t = \rho_\beta b_{t-1}$$

where $\rho_b \equiv \beta^{-1}(1 - \tau_b)$. We assume that $\rho_B \in (0, 1)$ so that debt converges back to its steady state value.

Equilibrium Goods market clearing requires that total spending by households and the government is equal to total production,

$$C_t + G = Y_t. \tag{4.12}$$

4.1 FIRE Transfer Multiplier

Under rational expectations, the log-linearized first-order conditions to the household's optimization problem imply the following aggregate consumption function:

$$c_t^* \left(\{y_{t+h}, t_{t+h}\}_{h=0}^{\infty}, b_t \right) = (1 - \beta\omega) \left(\beta^{-1} b_t + \sum_{h=0}^{\infty} (\beta\omega)^h \left[y_{t+h} - t_{t+h} \right] \right). \tag{4.13}$$

where $\mathbb{E}_t \left[\cdot \right]$ denotes the conditional expectations under full information and rational expectations. The MPC out of current income is given by:

$$m_0 \equiv 1 - \beta\omega \in (0, 1). \tag{4.14}$$

This framework nests the standard representative agent consumption function when $\omega = 1$, in which case the MPC reduces to $m_0 = 1 - \beta$. In standard calibrations $\beta \approx 1$. So, the MPC in the representative agent model is close to zero. The OLG structure within the HANK framework allows us to generate larger MPCs in a tractable manner. Specifically, as ω increases, the MPC out of current income rises.

Following Angeletos et al. (2024a,b), we can show that in a standard FIRE equilibrium

$$y_t^* = \mathbb{M}^* \left\{ (1 - \tau_b) d_t + \varepsilon_t \right\} = \chi^* \rho_B^t \varepsilon_0, \tag{4.15}$$

where the FIRE transfer multiplier, $\mathbb{M}^*$, is given by

$$\mathbb{M}^* = \frac{m_0}{1 - m_0} \frac{1 - \omega}{1 - \rho_b} \tag{4.16}$$

If $\omega = 1$, then the model features Ricardian Equivalence and $\mathbb{M}^* = 0$, i.e., aggregate demand and equilibrium output are not affected by government transfers. When $\omega < 1$, individuals discount future taxes more heavily than financial markets. So, a government transfer leads to an increase in aggregate demand, which generates an increase in output.

4.2 Equilibrium with Inattentive Consumers

In contrast to the simple example discussed in 3.1, in this model households must forecast future taxes and income. So, we generalize the simple example to allow individuals to be inattentive to future income and taxes. Consistent with that example, we endogenize the amount of attention using the extension of sparsity to dynamic programming developed by Gabaix (2023).

Given their expectations of future income and taxes, $E_t\left[y_{t+h}\right]$ and $E_t\left[t_{t+h}\right]$, aggregate demand is given by:

$$c_t^*\left(\left\{y_{t+h}, t_{t+h}\right\}_{h=0}^{\infty}, b_t\right) = (1-\beta\omega)\left(\beta^{-1}b_t + y_t - t_t + \sum_{h=1}^{\infty}(\beta\omega)^h\left\{E_t\left[y_{t+h}\right] - E_t\left[t_{t+h}\right]\right\}\right). \tag{4.17}$$

We allow people's level of attention to be source-dependent, i.e., they may pay a different amount of attention to future income and taxes. People's expectations of future income and taxes are given by

$$E_t\left[y_{t+h}\right] = \left(1-\lambda_y\right)y_{t+h}, \qquad E_t\left[t_{t+h}\right] = \left(1-\lambda_t\right)t_{t+h}. \tag{4.18}$$

People chooseλ_y and λ_t at the beginning of their life. For simplicity, we assume that attention levels are constant over time.

Let $\mathbb{L}$ denote the consumer's ex-ante expected losses from inattention. In the Appendix, we prove the following Proposition.

Proposition 2. *The quadratic approximation of the loss function around $\varepsilon_0 = 0$ is given by*

$$\mathbb{L} = \frac{1}{2}\psi\left[\lambda_y^2\sigma_y^2 + \lambda_t^2\sigma_t^2\right],$$

where $\psi > 0$ is a positive constant, σ_y^2 and σ_t^2 denote the ex-ante perceived variance of income and taxes, respectively.[16] *The consumer chooses attention to minimize $\mathbb{L} + \kappa\left(1-\lambda_y\right) + \kappa\left(1-\lambda_t\right)$, where $\kappa > 0$. Assume that the optimal levels of inattention are interior. Then λ_y and λ_t are given by*

$$\lambda_y = \min\left\{\frac{\kappa}{\psi\sigma_y^2}, 1\right\}, \quad \textit{and} \quad \lambda_t = \min\left\{\frac{\kappa}{\psi\sigma_t^2}, 1\right\}. \tag{4.19}$$

[16] To simplify the exposition, our economy features a single shock which is realized at date 0. The model can easily be extended to incorporate many shocks. Gabaix (2014, 2019) assumes that σ_y^2 and σ_t^2 coincide with the true ex-ante variances of output and taxes.

Under the optimal levels of attention, aggregate demand $c_t = \int c_{i,t} di$ is given by:

$$c_t\left(\{y_{t+h}, t_{t+h}\}_{h=0}^{\infty}, b_t\right) = c_t^*\left(\{y_{t+h}, t_{t+h}\}_{h=0}^{\infty}, b_t\right) + \overbrace{\lambda_t m_0 \sum_{h=1}^{\infty} (\beta\omega)^h t_{t+h}}^{RNE} \underbrace{-\lambda_y m_0 \sum_{h=1}^{\infty} (\beta\omega)^h y_{t+h}}_{GE\ Attenuation} \quad (4.20)$$

where $c_t^*\left(\{y_{t+h}, t_{t+h}\}_{h=0}^{\infty}, b_t\right)$ is given by equation (4.13).

Proposition 2 characterizes the optimal level of attention and aggregate consumption behavior when individuals are inattentive.

Proposition 3 shows that the transfer multiplier $\mathbb{M}$ can be decomposed into: (1) the FIRE transfer multiplier $\mathbb{M}^*$, (2) an RNE transfer multiplier $\mathbb{M}^{\text{RNE}}$ and (3) a GE-dampening factor, δ^{GE}.

Proposition 3 (The Transfer Multiplier with sparsity)**.** *Equilibrium output in the sparsity economy is given by*

$$y_t = \mathbb{M} \cdot \rho_b^t \cdot \varepsilon_0, \quad (4.21)$$

where the transfer multiplier $\mathbb{M}$ is given by:

$$\mathbb{M} = \left(\mathbb{M}^* + \mathbb{M}^{RNE}\right) \cdot \delta^{GE}. \quad (4.22)$$

The transfer multiplier can be decomposed into three terms:

1. The FIRE transfer multiplier, $\mathbb{M}^*$, given by (4.16).

2. The RNE transfer multiplier,

$$\mathbb{M}^{\text{RNE}} \equiv \frac{1-\beta\rho_B}{\beta\left(1-\rho_B\right)} m_0 \lambda_t > 0. \quad (4.23)$$

3. A GE dampening factor

$$\delta^{\text{GE}} = \frac{1-\rho_B}{1-\rho_B\left\{1-m_0\lambda_y\right\}} \in (0,1). \quad (4.24)$$

We now discuss each component of the transfer multiplier.

The FIRE transfer multiplier The first term, $\mathbb{M}^*$, is the FIRE transfer multiplier.

The RNE transfer multiplier The RNE transfer multiplier, $\mathbb{M}^{\text{RNE}}$ reflects the expansion in aggregate demand induced by RNE. Since $\mathbb{M}^{\text{RNE}}$ is positive, the RNE transfer multiplier increases the overall transfer multiplier relative to the FIRE benchmark.

Corollary 1 (Properties of the Transfer Multiplier)**.** *The transfer multiplier has the following properties:*

1. **Boundedness**:
$$\mathbb{M}^{\text{RNE}} \in \left[0, \frac{1-\beta\rho_B}{\beta\left(1-\rho_B\right)}\right]$$
and is equal to zero if and only if there are no dampening because of sparsity considerations, $\lambda_t = 0$.

2. **Dependence on the magnitude of behavioral dampening stemming from sparsity:**
$$\frac{d\mathbb{M}^{\text{RNE}}}{d\lambda_t} = \frac{1-\beta\rho_B}{\beta\left(1-\rho_B\right)} m_0 > 0.$$

3. **Dependence on the MPC**:
$$\frac{d\mathbb{M}^{\text{RNE}}}{dm_0} = \frac{1-\beta\rho_B}{\beta\left(1-\rho_B\right)} \lambda_t > 0.$$

4. **Complementarities between MPC and behavioral dampening**:
$$\frac{d^2\mathbb{M}^{\text{RNE}}}{d\lambda_t dm_0} = \frac{1-\beta\rho_B}{\beta\left(1-\rho_B\right)} > 0.$$

Corollary 1 highlights several important properties of the RNE transfer multiplier. First, the magnitude of the transfer multiplier crucially depends on λ_t, which summarizes the impact of sparsity on expectations. Second, there are strong complementarities between the MPC and the effect of sparsity. . If the MPC is low (high), then the response of aggregate demand to government transfers is quantitatively small (large), and the impact on the transfer multiplier is small (large). RANK models are typically calibrated with a value of β close to 1, the MPC is small, and $\mathbb{M}^{\text{RNE}} \approx 0$.

The GE-dampening factor We now discuss the GE-dampening factor that arises from sparsity. The following Corollary 2 establishes properties for this dampening factor that are similar to the RNE multiplier.

Corollary 2 (Properties of the GE Dampening Factor)**.** *The GE dampening factor has the following properties:*

1. **Boundedness**:
$$\delta^{\text{GE}} \in (0, 1)$$
and is equal to 1 if and only if there the behavioral dampening factorλ is equal to zero..

2. **Dependence on the magnitude of behavioral dampening stemming from sparsity:**
$$\frac{d\delta^{\text{GE}}}{d\lambda_y} = -\frac{1-\rho_B}{\left(1-\rho_B\left\{1-m_0\lambda_y\right\}\right)^2}\rho_B m_0 < 0.$$

3. **Dependence on the MPC**:
$$\frac{d\delta^{\text{GE}}}{dm_0} = -\frac{1-\rho_B}{\left(1-\rho_B\left\{1-m_0\lambda_y\right\}\right)^2}\rho_B \lambda_y < 0.$$

Corollary 2 establishes properties for the GE dampening factor that are similar to the RNE multiplier. Note that the degree of GE dampening increasing in the degree of behavioral dampening and the MPC, i.e., the overall transfer multiplier is smaller the larger are λ_y and m_0.

We attribute the breakdown of Ricardian Equivalence to limitations in agents' intertemporal foresight, operationalized through sparsity. Sparsity generates two countervailing forces that shape the equilibrium response to fiscal transfers. On the one hand, it implies that agents internalize future tax liabilities only partially, thereby undermining the prediction that the present value of government transfers is neutral. *Ceteris paribus*, this mechanism amplifies the impact of transfer shocks on aggregate demand and raises the transfer multiplier. On the other hand, sparsity also induces a GE dampening effect, as emphasized by Angeletos and Lian (2023). Specifically, because agents fail to fully integrate information about future income into their current consumption-savings decisions, the sensitivity of aggregate demand to anticipated income streams is muted relative to the benchmark of FIRE. Other things equal, this dampening effect reduces the equilibrium transfer multiplier. The relative strength of these opposing mechanisms and their net effect on the multiplier is theoretically ambiguous. For this reason, we turn to a quantitative analysis of these forces.

5 Quantitative Model

The model in the previous section3 is deliberately stylized to facilitate analytical tractability, . In this section, we turn to a quantitative evaluation of the role of RNE in shaping the transmission of fiscal stimulus. We conduct our analysis within a standard HANK framework. Our analysis builds on Auclert et al. (2024, 2020) and Guerreiro (2023). The section provides a concise overview of the model's key structural components. Further technical details are presented in the appendix.

Households The economy is inhabited by a continuum of infinitely lived households indexed by $i \in [0,1]$. Households face uninsurable idiosyncratic-income risk. At each date $t = 0, 1, ...$, household i consumes $c_{i,t}$ and works $n_{i,t}$. Their utility function is given by

$$E_{i,t}\left[\sum_{t=0}^{\infty} \beta^t u\left(c_{i,t}, n_{i,t}\right)\right], \tag{5.1}$$

where $u(c,n) = \frac{c^{1-\sigma^{-1}}}{1-\sigma^{-1}} - \chi \frac{n^{1+\psi^{-1}}}{1+\psi^{-1}}$.

At each date t, household i's idiosyncratic productivity state is given by $e_{i,t}$. The idiosyncratic productivity shock is an AR(1) process with persistence parameter ρ and variance σ_e^2.

Households can save in one-period risk-free bonds. They enter the period with $a_{i,t}$ assets on which they earn the real interest rate r_t. The household's time-t budget constraint is given by

$$c_{i,t} + a_{i,t+1} = (1 - \tau_t)\, e_{i,t} w_t n_{i,t} + R_t a_{i,t} - T_t, \tag{5.2}$$

where $c_{i,t}$ is household consumption, w_t, and $n_{i,t}$ denote the wage rate and hours worked, and τ_t and T_t denote the proportional tax rate on labor and lump-sum taxes, respectively. All households are subject to a standard borrowing constraint

$$a_{i,t+1} \geq 0. \tag{5.3}$$

Firms A continuum of identical firms operates in a perfectly competitive product market. They hire labor N_t and produce $Y_t = N_t$. Profit maximization by final goods firms implies that, in equilibrium, the real wage is constant, $w_t = 1$. It follows that price inflation π_t equals nominal-wage inflation π_t^w.

Wage NKPC Following the standard approach in the NK literature, we assume workers belong to monopolistic labor unions that face nominal wage adjustment costs (see for example Erceg, Henderson, and Levin (2000), Schmitt-Grohé and Uribe (2005), and Auclert et al. (2024)). As in Auclert et al. (2024), we assume an equal rationing rule which implies that $n_{i,t} = N_t$ for all i. Under these assumptions, we show in the Appendix that the NK Phillips curve is given by:

$$\pi_t^w = \kappa_w \left[\sigma \hat{c}_t + \psi n_t - (\hat{y}_t - \hat{\tau}_t - \hat{n}_t)\right] + \beta \mathbb{E}_t \left[\pi_{t+1}^w\right]. \tag{5.4}$$

Here κ_w is a scalar that depends on the costs of adjusting wages. The higher are those costs, the larger is κ_w.

Fiscal and monetary policies The government spends G and issues debt B_t. The government's budget constraint is given by

$$G + (1 + r_t) B_t = \tau_t \cdot Y_t + T_t + B_{t+1}. \tag{5.5}$$

As in the previous model, we assume that the process for government debt follows:

$$dB_{t+1} = \rho_b dB_t - dT_t, \tag{5.6}$$

where dX_t denotes the deviation of X_t from steady state.

Monetary policy is given by the following Taylor rule:

$$(1 + i_t) = (1 + r^*) e^{\phi_\pi \pi_t}. \tag{5.7}$$

Aggregation and equilibrium Aggregate demand is given by $C_t = \int_0^1 c_{i,t} di$ and aggregate asset demand is given by $A_t = \int_0^1 a_{i,t} di$. Market clearing in the goods and asset markets implies

$$C_t + G = Y_t = N_t \quad \text{and} \quad A_t = B_t,$$

respectively.

Sparsity – Optimal inattention We endogenize beliefs following the sparsity model. Household expectations are given by

$$E_{i,t} \left[dX_{t+h}\right] = (1 - \lambda_{X,h}) \, \mathbb{E}_t \left[dX_{t+h}\right], \quad h \in \{1, 2, ...\}, \tag{5.8}$$

with initial condition $E_{i,-1}[dX_t] = 0$ for $X \in \{\tau, r, Y, T\}$. As in the simple model, households choose their attention level once and for always at $t = -1$. In Under our assumptions, the optimal level of inattention is given by

$$\lambda_{X,h} = \min \left\{ \frac{\kappa^{\text{cogn}}}{\int \frac{\partial^2 v(a,x)}{\partial c^2} \left(\frac{\partial c(a,z)}{\partial X_h} \right)^2 dD(a,z) \cdot \sigma_X^2}, 1 \right\}. \tag{5.9}$$

See the Appendix. The model collapses to the full-information and rational expectations benchmark when $\kappa^{\text{cogn}} = 0$.

5.1 Calibration

We calibrate the model to a quarterly frequency and a steady state with zero inflation. Table 1 reports the values of calibrated parameters. We set the intertemporal elasticity of substitution to a standard number, $\sigma = 0.5$, and the Frisch elasticity to $\psi = 0.75$, following Chetty, Guren, Manoli, and Weber (2011).

We normalize the steady state so that output $Y = N = 1$, which implies that the parameter which governs the parameter governing the disutility of labor, χ, is equal to 0.64. Productivity shocks are drawn from a discretized AR(1) process with persistence parameter $\rho_e = 0.95$ and standard deviation $\sigma_e = 0.75$. As in Auclert et al. (2024), we set the government spending to GDP ratio to 0.20. We calibrate the discount factor β and the level of debt-to-GDP, B, so that the steady-state annual real interest rate equals 2%, and the average annual MPC out of an individual transfer is 0.32. The latter value is consistent with the average MPC of the individual transfer in our survey, i.e., Treatment 1. This procedure yields $\beta = 0.96$ and $B = 3.92$. Steady-lump sum taxes are set to $T = 0$, implying that the marginal tax rate that finances steady state spending and interest on debt equals $\tau = 0.19$.

We assume the Taylor coefficient, $\phi_\pi$is equal to1.5, a standard value in the NK literature (see for example Christiano, Eichenbaum, and Rebelo (2011)). Consistent with the empirical results in Hazell, Herreno, Nakamura, and Steinsson (2022), we set the nominal rigidities parameter $\kappa_w = 0.0062$. Following Auclert et al. (2024), we set the annual persistence of debt to 0.93, which implies that the quarterly persistence parameter, ρ_B, equals 0.98.

Calibrating the Cognitive Cost Parameter κ^{cogn} To calibrate the cognitive costs parameter, κ^{cogn}, we evaluate people's planned-spending response to a transfer even before they

Table 1: Calibrated Parameters

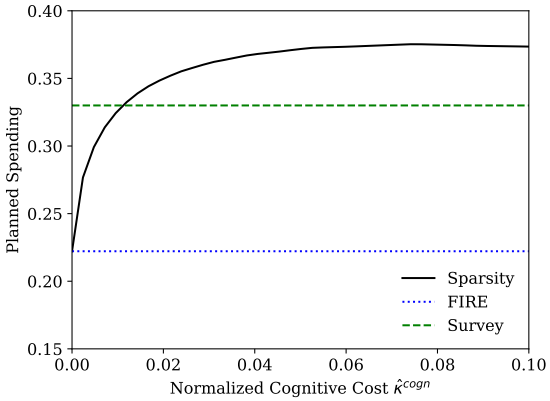
Parameter	Description	Value	Parameter	Description	Value
σ	IES	0.5	ρ_B	Persistence of debt	0.98
β	Discount factor	0.96	G	Spending	0.20
r	Real interest rate	0.5%	B	Assets	3.92
ρ_e	Persistence e	0.95	ϕ_π	Taylor coefficient	1.5
σ_e	Variance e	0.75	κ^{cogn}	Cognitive Cost	0.0007
χ	Labor disutility	0.64	σ_Y	St. Dev. of Y_t	1
ψ	Frisch	0.76	σ_τ	St. Dev. of τ_t	1
κ_w	Wage Rigidity	0.0062	σ_r	St. Dev. of r_t	0.16

observe any realizations of income, interest rates, or inflation in real time. This procedure amounts to replicating our survey treatment 2 using our quantitative model. Figure 5.1 displays the planned-spending response of aggregate demand to a one-time government transfer depends on the level of cognitive costs κ^{cogn}.[17] We normalize the standard deviation of output to one, $\sigma_Y = 1$. The quarterly standard deviations of real interest rates, $\sigma_r = 0.268$, and tax rates, $\sigma_\tau = 0.409$, using data on real interest rates and tax rates.

When $\kappa^{\text{cogn}} = 0$, the model collapses to the FIRE benchmark. Recall that, due to borrowing constraints and incomplete markets, Ricardian Equivalence fails in this model even under FIRE. However, as this figure shows the failure of Ricardian Equivalence associated with those borrowing constraints alone is not consistent with the patterns of planned spending response observed in our micro-data. The higher the cognitive costs, the more inattentive consumers are to future changes in incomes, taxes, interest rates, and inflation. According to our survey, people would increase their spending by 0.33 after such a transfer. We calibrate the cognitive parameter κ^{cogn}, so that the aggregate demand response matches the survey findings.

[17] In the x-axis, we normalize $\hat{\kappa}^{\text{cogn}}$ so that it corresponds to the level of attention to one-period ahead income. This normalization is given by $\hat{\kappa}^{\text{cogn}} = \frac{\kappa^{\text{cogn}}}{\int \frac{\partial^2 v(a,x)}{\partial c^2} \left(\frac{\partial c(a,z)}{\partial Y_1}\right)^2 dD(a,z) \cdot \sigma_Y^2}$. Since we do not have the empirical counterpart of the variance of lump-sum taxes from the data, we set the attention to lump-sum taxes equal to the model implied attention to tax rates.

Figure 5.1: Consumption Response to Transfers under Sparsity



Notes: This figure displays the change in the first-year transfer multiplier as the cognitive cost changes. The continuous black line displays the transfer multiplier under sparsity for different levels of the cognitive cost. The dotted blue line displays the transfer multiplier under FIRE, and the dashed green line displays the consumption response in our survey.

6 The Macro Consequences of Stimulus Checks

Following the Covid-19 pandemic, the US government made $931 billion direct payments to individuals.[18] In this subsection, we analyze the GE consequences of a uniform transfer to all agents of that order of magnitude. Recall that we have normalized quarterly GDP to one. This normalization implies that the magnitude of the transfer shock is equal to 0.16, i.e., the magnitude of the shock is 16% of GDP.[19] In this subsection, we assume the deficit is financed with future lump-sum taxes. Labor taxes τ are fixed at their steady-state level.

6.1 The Transfer Multiplier

Panel A of Table 2 reports the first-year transfer multiplier under FIRE and sparsity. To put these numbers in context, recall that, under Ricardian Equivalence, the overall transfer multiplier is zero. Ricardian Equivalence does not hold in the HANK economy even under FIRE. This failure reflects the presence of liquidity constraints in that model. In our HANK model, the first-year transfer multiplier under FIRE is 0.22. That FIRE transfer multiplier is substantially smaller than the average MPC in that model, 0.32. Intuitively, the anticipation of higher future taxes reduces aggregate demand inducing a partial offset to the high MPC.

In contrast, under sparsity, that multiplier equals 0.31, a 41 percent increase relative

[18] See U.S. Government Accountability Office: https://www.gao.gov/products/gao-22-106044.

[19] We obtain this number by dividing the size of the direct payments by total GDP in 2023 and multiplying by 4.

to FIRE. This increase reflects that, under sparsity, people do not anticipate higher future taxes when the transfer initially occurs.

Proposition 3 decomposes the overall transfer multiplier in the sparsity economy into three components: (i) the effect under FIRE, (ii) an RNE term, and (iii) a GE dampening term. To isolate the magnitude of (ii), we consider an auxiliary economy in which people exhibit limited attention only to future taxes, i.e., they fully internalize the GE effects of the transfer. So, by construction, the GE-dampening factor is zero in this auxiliary economy. We refer to this auxiliary model as the RNE-only model. The magnitude of the RNE term is equal to the difference between the transfer multiplier in the RNE-only model and the transfer multiplier under FIRE. The GE-dampening factor equals the difference between the multiplier under sparsity and the multiplier in the RNE-only model.

The transfer multiplier in the RNE-only model is equal to 0.31. This finding implies that people's failure to anticipate taxes accounts for the high value of the multiplier in our sparsity economy relative to FIRE. Interestingly, the GE dampening effect has a small effect on the multiplier, reducing it only slightly. The latter finding is surprising in light of the broader literature (see Section 1.1) about the impact of deviations from FIRE on the size of the multiplier.

Table 2: The Transfer Multiplier

Panel A: The Transfer Multiplier

Model	**Response**	**% Change from FIRE**
Sparsity	0.31	41%
FIRE	0.22	–
RNE-only	0.31	41%

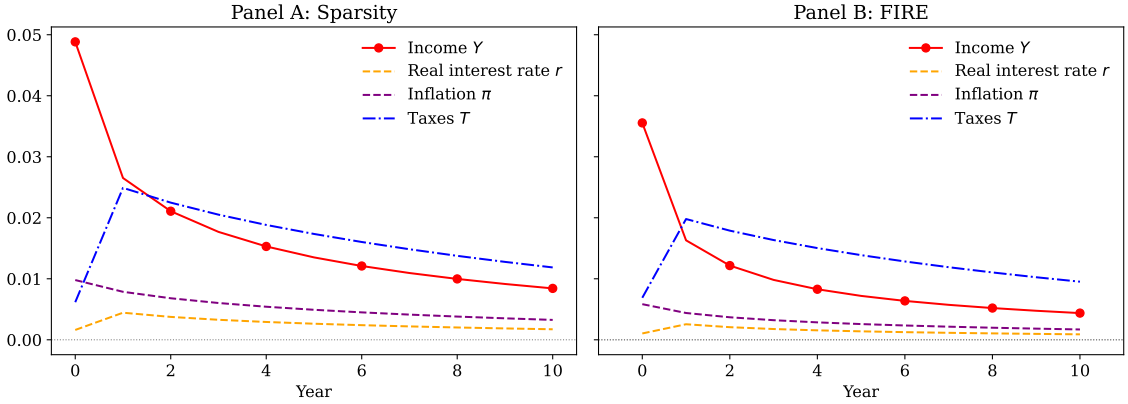
Panel B: GE Attenuation

GE Component	**Change from RNE**
Inattention to Y	–0.01
Inattention to r	+0.01
GE-dampening	≈–0.00

Notes: Panel A reports the output multiplier to a government transfer under three model specifications: (i) a benchmark model with FIRE, (ii) a model with only RNE, and (iii) a model incorporating both RNE and GE inattention (Sparsity). The Change from FIRE columns report the difference in responses relative to the FIRE benchmark. Panel B decomposes the GE dampening effect observed in the sparsity model into two components: inattention to future income (inattention to Y) and inattention to future real interest rates (inattention to r). The net GE effect captures the aggregate impact of GE inattention. Output responses are expressed in levels, and the Change from FIRE is computed relative to the FIRE output response (0.23).

To interpret the magnitude of the GE dampening effect, we decompose it into two distinct components: the attenuation due to inattention to income and the attenuation due to inattention to interest rates. Toward this end, we introduce a second auxiliary economy in which people are inattentive to taxes and income but are fully attentive to the interest

Figure 6.1: Dynamic Responses to an Unanticipated Increase in Transfers



Notes: This figure displays the economy's response to a one-time transfer shock at time zero. Panel A displays the impulse response function of GDP/income in log deviations from steady state in the dotted red line, the impulse response function of changes in lump-sum taxes from their steady state level in the dash-dot blue line, and the percentage point changes in inflation in dash purple line and real interest rates in the dash yellow line, for the economy under Sparsity. Panel B displays the analog impulse responses for the economy under FIRE.

rate. This intermediate environment allows us to isolate the marginal contribution of inattention to output *per se* to the overall transfer multiplier. The attenuation in the multiplier due to inattention to interest rates is equal to the difference between the transfer multiplier under full sparsity and the second auxiliary economy. By construction, the sum of these two components—output inattention and interest rate inattention—exhausts the GE dampening factor.

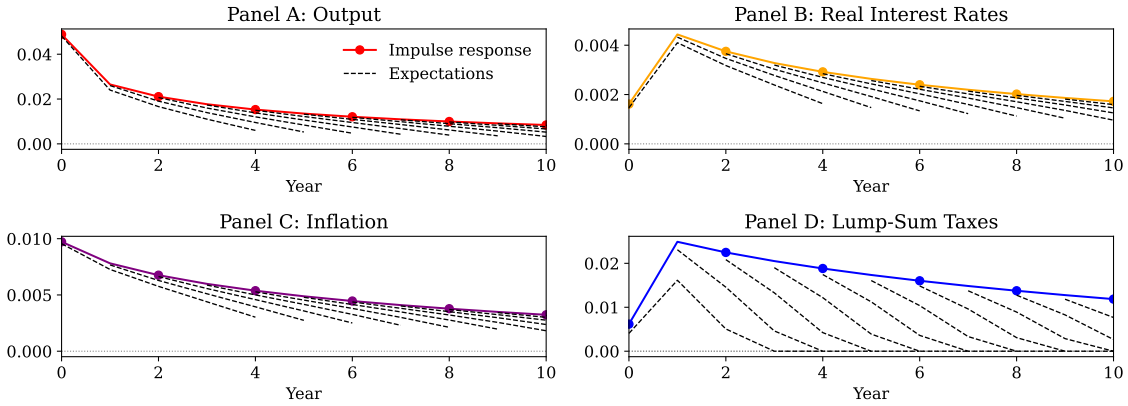
Panel B of Table 2 presents our results. Note that the GE dampening effect is small, reflecting the interaction of two opposing mechanisms. First, inattention to income *reduces* the multiplier by approximately 0.01. Second, inattention to real interest rates *increases* the multiplier by approximately 0.01. The net effect is a small GE dampening is essentially zero.

6.2 The Dynamic Response of Aggregates to Transfer Payments

Figure 6.1 presents the dynamic impulse response functions for output, the real interest rate, inflation, and lump-sum taxes in response to a one-time stimulus check at date $t = 0$ in the model. Panel A displays the impulse response functions in the HANK economy under sparsity and Panel B displays the impulse response functions in the HANK economy under FIRE. For exposition purposes, we report the impulse response functions at an annual frequency.

The figure shows that the transfer payment leads to a larger and more persistent rise

Figure 6.2: The Evolution of Expectations Under Sparsity



Notes: This figure displays the response of output (Panel A), real interest rates (Panel B), inflation (Panel C), and Lump-sum taxes (Panel D) to a one-time transfer shock under sparsity. In each panel the dashed lines represent people's expectations for each variable at each point in time and for different horizons.

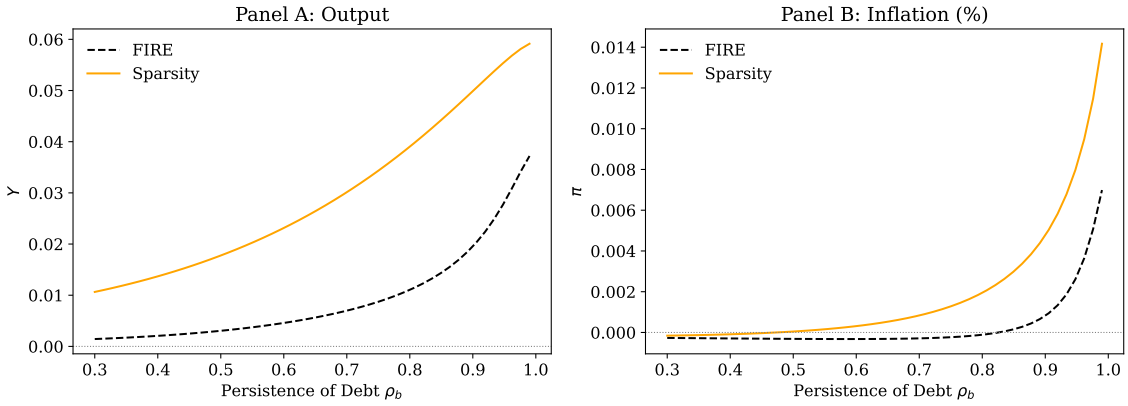
in output and inflation under sparsity than under FIRE. To provide intuition into the dynamic effects, figure 6.2 displays the evolution of people's expectations that underlie the response of output to the transfers. The dotted lines display people's expectations at different points in time for the future evolution of various variables at different horizons. Note that people's expectations of movements in aggregate variables are always muted relative to the actual evolution of those variables. For example, at time 0 people do not expect lump-sum taxes to change very much. At every point in time, people revise their expectations. Since people pay a lot of attention to variables that are close in time to their decisions, their expectations of lump-sum taxes at year t are relatively close to their actual response in that year. However, at each point in time, people substantially underestimate the magnitude of *future* lump-sum taxes. This pattern of expectations for future taxes lies at the core of RNE.

6.3 How fast are deficits taxed back?

Panels A and B of Figure 6.3 illustrate the sensitivity of aggregate output and inflation to variations in the persistence of fiscal debt, ρ_B. Consistent with findings in the HANK literature, under FIRE, a more persistent fiscal debt (a higher value of ρ_B) amplifies the response of output and inflation to a fiscal transfer.

The output multiplier is larger under sparsity than under FIRE for all levels of persistence ρ_B. Furthermore, the gap between these two lines is larger the higher the persistence parameter ρ_B. The intuition for these results is as follows. Under sparsity, agents are more inattentive to events that occur further in the future. The higher is ρ_B, the more

Figure 6.3: The Impact of Debt Persistence



Notes: This figure displays the first-year responses of output and inflation as the persistence of fiscal debt ρ_B rises. The continuous orange line displays these responses under sparsity, and the dashed black line displays the responses under FIRE.

back-loaded are the taxes that pay for the initial transfer. So, other things equal, people's expectations of future taxes are lower the higher is ρ_B. That effect translates into a larger response of output and inflation.

6.4 Distortionary Labor Taxation

In this section, we consider the case in which lump-sum taxes are zero. The government changes proportional taxes τ_t to finance transfer payments, i.e., the government budget constraint is given by

$$G_t + (1 + r_t) B_t = \tau_t Y_t + B_{t+1}$$

and lump-sum taxes, $T_t = 0$.

Table 3 decomposes the overall transfer multiplier into the effects from RNE and the GE dampening factor. The results are consistent with those discussed in Table 2. The transfer multiplier under sparsity is 0.35, slightly larger than it is under lump-sum taxes. This result reflects that proportional taxes are less regressive than lump-sum taxes, leading to a larger response of consumption. Panel B displays the decomposition of the response of aggregate output into direct and indirect channels. As in the case of lump-sum taxes, the GE dampening effect is small relative to the impact of RNE. We conclude that the financing transfers via lump-sum and distortionary taxes lead to broadly similar results regarding the impact of RNE on the effect of transfers on economic activity. Figure 6.4 displays the dynamic responses for output, inflation, real interest rates, and the tax rate under Sparsity (Panel A) and FIRE (Panel B). The results in Figure 6.4 are broadly

consistent with those in Figure 6.1.

Table 3: The Transfer Multiplier

Panel A: The Transfer Multiplier

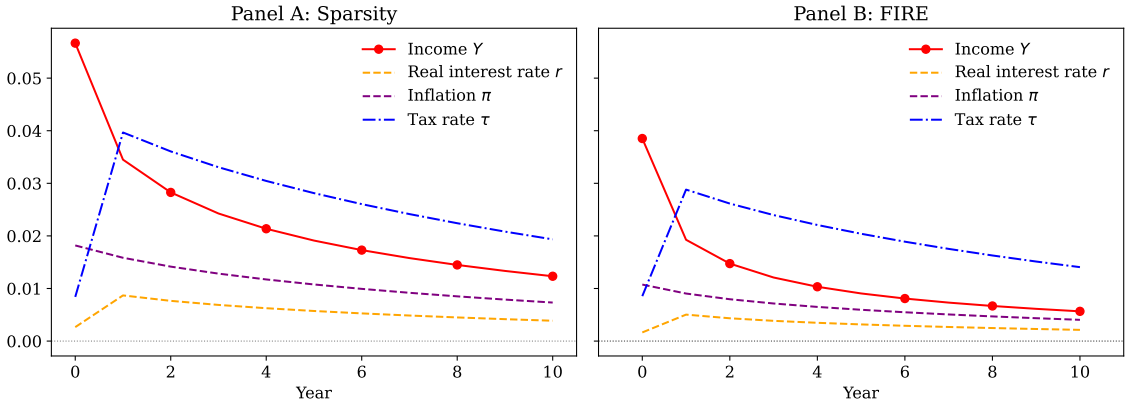
Model	Response	% Change from FIRE
Sparsity	0.35	46%
FIRE	0.24	–
RNE-only	0.29	21%

Panel B: GE Attenuation

GE Component	Change from RNE
Inattention to Y	–0.01
Inattention to r	+0.08
GE-dampening	+0.06

Notes: Panel A reports the output multiplier to a government transfer under three model specifications: (i) a benchmark model with FIRE, (ii) a model with only RNE, and (iii) a model incorporating both RNE and GE inattention (Sparsity). The Change from Fire columns report the difference in responses relative to the FIRE benchmark. Panel B decomposes the GE dampening effect observed in the sparsity model into two components: inattention to future income (inattention to Y) and inattention to future real interest rates (inattention to r). The net GE effect captures the aggregate impact of GE inattention. Output responses are expressed in levels, and the Change from FIRE is computed relative to the FIRE output response (0.23).

Figure 6.4: Dynamic Responses to an Unanticipated Increase in Transfers with Distortionary Labor Taxes



Notes: This figure displays the economy's response to a one-time transfer shock at time zero. Panel A displays the impulse response function of GDP/income in log-deviations from steady state in the dotted red line, the impulse response function of changes in tax rates from their steady state level in the dash-dot blue line, and the percentage point changes in inflation in dash purple line and real interest rates in the dash yellow line, for the economy under Sparsity. Panel B displays the analog impulse responses for the economy under FIRE.

7 The Macro Consequences of Fiscal Spending

We now use our HANK model to analyze the response of output to government spending shocks. We focus on the case of distortionary labor taxation. The debt rule is given by $dB_{t+1} = \rho_B (dB_t + dG_t)$. We assume that $dG_t = \rho_G dG_0$ where $\rho_G = 0.93$, implying an annual persistence of spending of 0.76.

7.1 The Fiscal-Spending Multiplier

Table 4 shows the first-year government-spending multiplier, defined as $\frac{\sum_{t=0}^{3}(1+r)^{-t}dY_t}{\sum_{t=0}^{3}(1+r)^{-t}dG_t}$. Panel A of Table 2 reports the first-year multiplier under FIRE and sparsity. In our HANK model, the first-year multiplier under FIRE is 0.95, implying that consumption *falls* after the increase in government spending. In contrast, under sparsity, the multiplier rises to 1.16, implying that consumption *rises* after the increase in government spending. That increase reflects that people do not anticipate higher future taxes when the transfer initially occurs.

To further analyze the effects of sparsity, we consider an economy with RNE only but no GE dampening effects, i.e., people are only inattentive to taxes. The procedure we use to calculate the equilibrium in this economy is the same as the one discussed in Section 6.1. The fiscal spending multiplier in the RNE-only economy is equal to 1.10, a value slightly lower than the multiplier under full sparsity. As in the response to the transfer shock, the GE dampening effect is small but positive. The small magnitude reflects opposing forces from inattention to income versus inattention to real interest rates. The net effect of GE dampening is to increases the multiplier by approximately 0.06 relative to the RNE-only model.

Table 4: Decomposing the First-Year Responses of Output and Inflation

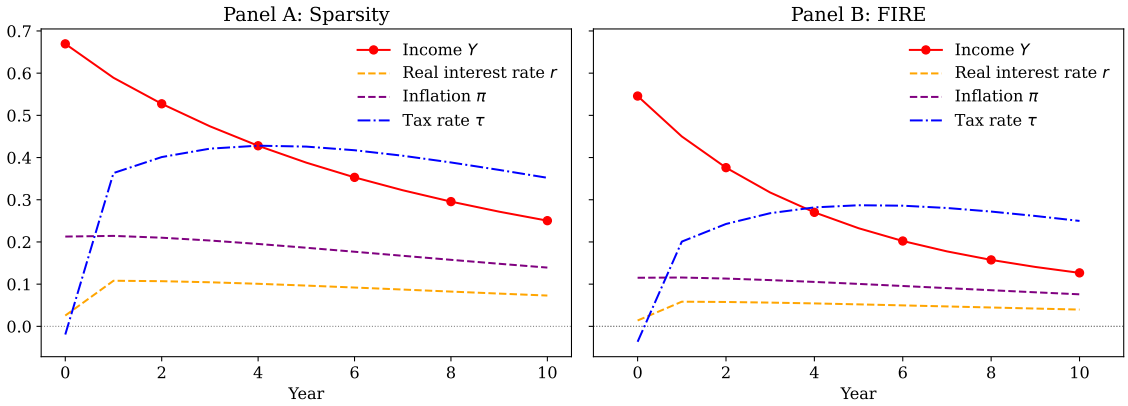
Panel A: Fiscal-Spending Multiplier			Panel B: GE Dampening	
Model	**Response**	**% Change from FIRE**	**GE Component**	**Change from RNE**
Sparsity	1.16	+23%	*Inattention to Y*	–0.07
FIRE	0.95	–	*Inattention to r*	+0.13
RNE-only	1.10	+16%	*GE Dampening*	+0.06

Notes: Panel A reports the first-year output and inflation responses to an increase in government spending with persistent $\rho_g = 0.934$ under three model specifications: (i) a benchmark model with FIRE, (ii) a model with only RNE, and (iii) a model incorporating both RNE and GE inattention (Sparsity). The Change from FIRE columns report the difference in responses relative to the FIRE benchmark. Panel B decomposes the GE dampening effect observed in the sparsity model into two components: inattention to future income (inattention to Y) and inattention to future real interest rates (inattention to r). The net GE effect captures the aggregate impact of GE inattention. Inflation responses are reported in percentage points (p.p.). Output responses are expressed in levels, and the Change from FIRE is computed relative to the FIRE output response (0.23).

7.2 The Dynamic Response of Aggregates to Fiscal Spending

Figure 7.1 presents the dynamic impulse response functions for output, the real interest rate, inflation, and lump-sum taxes in response to a a government spending shock. Panel A displays the impulse response functions in the HANK economy under sparsity, and Panel B displays the impulse response functions in the HANK economy under FIRE. We report the impulse response functions at an annual frequency for exposition purposes. The figure shows that fiscal spending leads to a larger and more persistent rise in output and inflation under sparsity than under FIRE.

Figure 7.1: Dynamic Responses to an Unanticipated Increase in Fiscal Spending



Notes: This figure displays the economy's response to fiscal-spending shock. Panel A displays the impulse response function of GDP/income in log-deviations from the steady state in the dotted red line, the impulse response function of changes in tax rates from their steady-state level in the dash-dot blue line, and the percentage point changes in inflation in dash purple line and real interest rates in the dash yellow line, for the economy under Sparsity. Panel B displays the analog impulse responses for the economy under FIRE.

8 Conclusions

This paper provides empirical evidence that people do not internalize future tax liabilities stemming from government transfers into their current spending decisions. Specifically, we design and implement a novel survey to measure households' spending responses under alternative policy scenarios. Our survey results indicate that people display an elevated consumption response to government transfers relative to the FIRE benchmark. It follows that Ricardian Equivalence does not hold.

We develop a model that micro-founds this failure of Ricardian Equivalence using insights from the literature on bounded rationality. We embed this mechanism into a Heterogeneous-Agent New Keynesian model and demonstrate that Ricardian Non-Equivalence substantially magnifies the aggregate impact of fiscal policy. Critically, we highlight an important complementarity between HANK and Ricardian Non-Equivalence: the larger the MPC, the greater the quantitative importance of this behavioral channel. Taken together, our results suggest that fiscal transfers can significantly impact economic activity and play a useful role in stabilization policies.

A limitation of our analysis is that our model does not incorporate capital and investment. So, our model is silent on the extent to which fiscal policy crowds out private investment. Investigating these effects, and how departures from FIRE influence them, is an important task that we leave for future research.

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A Additional Tables

Table A.1: Distributions in Survey Sample vs. Population

		Survey	US
Gender			
	Female	50%	51%
	Male	48%	49%
	Other (Non-binary/Prefer not to say)	2%	-
Political Affiliation			
	Democrat	32%	32%
	Republican	30%	29%
	Independent/Non-affiliated	36%	37%
	Other	2%	2%
	None	-	7%
Age Group			
	22-30 years old	30%	21%
	31-40 years old	31%	24%
	41-50 years old	21%	22%
	51-60 years old	13%	22%
	61-65 years old	4%	11%
Ethnicity			
	White	65%	75%
	Black or African American	18%	14%
	Asian	5%	7%
	Native American/Alaska Native	1%	1%
	Native Hawaiian or Other Pacific Islander	0%	0%
	Other	3%	2%
Employment Status			
	Full-time	56%	66%
	Part-time	17%	10%
	Not in paid work (e.g., homemaker, retired, or disabled)	12%	22%
	Unemployed (and job-seeking)	11%	3%
	Other	4%	0%
Education			
	No formal education	1%	4%
	Secondary education	3%	4%
	High school diploma	39%	42%
	Technical/community college	15%	11%
	Undergraduate degree	27%	25%
	Graduate degree	12%	12%
	Doctorate degree	2%	2%

Table A.2: Distributions in Each Experiment Sample vs. Population

		T1	T2	T3
Gender				
	Female	50%	49%	52%
	Male	48%	49%	46%
	Other (Non-binary/Prefer not to say)	2%	2%	2%
Political Affiliation				
	Democrat	33%	32%	31%
	Republican	28%	31%	30%
	Independent/Non-affiliated	36%	35%	37%
	Other	2%	2%	2%
Age Group				
	22-30 years old	31%	31%	28%
	31-40 years old	31%	30%	33%
	41-50 years old	22%	20%	22%
	51-60 years old	12%	15%	13%
	61-65 years old	4%	4%	4%
Ethnicity				
	White	65%	64%	66%
	Black or African American	19%	18%	17%
	Asian	5%	5%	5%
	Hispanic/Latino	7%	8%	7%
	Native American/Alaska Native	1%	1%	1%
	Native Hawaiian or Other Pacific Islander	0%	0%	0%
	Other	3%	3%	3%
Employment Status				
	Full-time	55%	57%	55%
	Part-time	18%	16%	17%
	Not in paid work (e.g., homemaker, retired, or disabled)	12%	12%	12%
	Unemployed (and job-seeking)	11%	11%	10%
	Other	5%	4%	6%
Education				
	No formal education	1%	2%	2%
	Secondary education	3%	3%	2%
	High school diploma	40%	39%	39%
	Technical/community college	15%	14%	15%
	Undergraduate degree	26%	28%	27%
	Graduate degree	13%	12%	13%
	Doctorate degree	2%	3%	2%

Table A.3: Tax Expectations

Horizon	1 year		2 years		6 years	
Treatment 2	-0.003	0.050	-0.254	0.017	-0.361	-0.027
	(0.258)	(0.188)	(0.235)	(0.169)	(0.301)	(0.215)
Treatment 3	0.843***	1.037***	0.749***	0.941***	0.335	0.357*
	(0.260)	(0.189)	(0.236)	(0.170)	(0.301)	(0.216)
Prior		✓		✓		✓
Observations	5,706	5,640	5,673	5,577	5,688	5,555

Standard errors in parentheses.* $p < 0.10$,** $p < 0.05$, *** $p < 0.01$

Table A.4: Income Expectations

Horizon	1 year		2 years		6 years	
Treatment 2	0.007	0.079	-0.260	0.232	-0.369	-0.005
	(0.310)	(0.236)	(0.309)	(0.209)	(0.400)	(0.294)
Treatment 3	0.585*	0.434*	0.549*	0.433**	-0.101	-0.156
	(0.311)	(0.237)	(0.310)	(0.209)	(0.402)	(0.296)
Prior		✓		✓		✓
Observations	5,651	5,613	5,721	5,611	5,646	5,573

Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.5: Interest Rate Expectations

Horizon	1 year		2 years		6 years	
Treatment 2	-0.0778	-0.0614	-0.112	-0.0260	-0.136	-0.0817
	(0.151)	(0.100)	(0.176)	(0.115)	(0.223)	(0.143)
Treatment 3	0.176	0.0856	0.119	0.0225	-0.118	-0.344**
	(0.152)	(0.101)	(0.177)	(0.115)	(0.224)	(0.144)
Prior		✓		✓		✓
N	5,607	5,748	5,625	5,754	5,656	5,779

Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

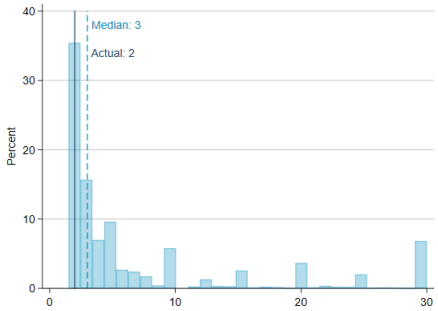
Table A.6: Inflation Expectations

Horizon	1 year		2 years		6 years	
Treatment 2	0.236	0.188*	0.144	0.0304	0.183	0.221
	(0.169)	(0.110)	(0.182)	(0.115)	(0.236)	(0.159)
Treatment 3	0.486***	0.396***	0.386**	0.223*	0.368	0.355**
	(0.170)	(0.111)	(0.182)	(0.116)	(0.236)	(0.159)
Prior		✓		✓		✓
Observations	5,752	5,650	5,702	5,576	5,711	5,619

Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

B Additional Figures

Figure B.1: People's Perception of the Federal Reserve Bank's Inflation Target



Note: This figure presents the distribution of responses to three survey questions regarding the Federal Reserve Bank's inflation target: "What is the Federal Reserve Bank's target inflation rate over the long run?" To enhance interpretability, the data have been truncated, excluding values above 30. The median estimates provided by respondents are indicated with dashed lines, while the actual true values are represented by solid lines.

C Proofs and additional results for section 3

C.1 Intertemporal marginal propensities to consume

Note that, absent the shock, the Euler equation is given by:

$$u'(C_0) = \beta R u'(Y_1 - T_1 + R(Y_0 - T_0 - C_0)).$$

Note that the intertemporal marginal propensities to consume are given by $m_0 = \frac{\partial C_0}{\partial Y_0}$ and $m_1 = \frac{\partial C_0}{\partial Y_1}$. Using the equation above we can solve for these objects. First, note that

$$u''(\overline{C}_0) m_0 = \beta R^2 u''(\overline{C}_1)\{1 - m_0\} \Leftrightarrow m_{i,0} = \frac{\beta R^2 u''(\overline{C}_1)}{u''(\overline{C}_0) + \beta R^2 u''(\overline{C}_1)}$$

and

$$u m''(\overline{C}_0) m_1 = \beta R u''(\overline{C}_1)\{1 - R m_1\} \Leftrightarrow m_{i,1} = \frac{\beta R u''(\overline{C}_1)}{u''(\overline{C}_0) + \beta R^2 u''(\overline{C}_1)},$$

where $\overline{C}_0$ and $\overline{C}_1$ denote the baseline levels of consumption at times 0 and 1, respectively.

C.2 Proof of Lemma 1

Let

$$v(C_0) = u(C_0) + \beta u(Y_1 - T_1 + R(Y_0 - T_0 - C_0))$$

denote the realized utility given the choice C_0. Then, the quadratic approximation around $C_0 = \overline{C}_0$, $\varepsilon_0 = 0$, and $t_1 = 0$ is given by:

$$v(c_0) \approx v(\overline{C}_0) - \frac{1}{2}\psi \cdot c_0^2 + \psi \cdot c_0^* \cdot c_0 + \text{other terms independent of } c_0.$$

where $\psi \equiv -u''(\overline{C}_0) - \beta R^2 u''(\overline{C}_1)$. Note that c_0 solves $\max E_0 v(c_0)$, so $c_0 = E_0[c_0^*]$. This implies that the realized loss from inattention is given by

$$\frac{1}{2}\psi [c_0^* - E_0 c_0^*]^2$$

So

$$\mathbb{L} = \frac{1}{2}\psi \mathbb{E}_- \left[(c_0^* - E_0 c_0^*)^2\right].$$

C.3 Rational inattention

We consider a Gaussian and linear-quadratic approximation of the model. First, consumers believe $\varepsilon_0 \sim \mathcal{N}\left(0, \tau_\varepsilon^{-1}\right)$ and their loss function from inattention is still given by 3.7. As is standard in the literature, Gaussian signals are optimal, so the agent chooses the precision τ and obtains a signal

$$s = \varepsilon_0 + \frac{\eta}{\sqrt{\tau}},$$

where $\eta \sim \mathcal{N}(0,1)$. Upon receiving the signal, individuals update their expectations to

$$E[\varepsilon_0|s] = (1-\lambda)\, s,$$

where $\lambda = \frac{\tau_\varepsilon}{\tau_\varepsilon+\tau}$. Furthermore, because they are rational, their expectations of future taxes are

$$E[t_1|s] = E[R\varepsilon_0|s] = R(1-\lambda)\, s.$$

It follows that their expenditure:

$$\begin{aligned} c_0 &= m_0 E[\varepsilon_0|s] - m_1 E[t_1|s] = (m_0 - m_1 R)\, E[\varepsilon_0|s] \\ &= (m_0 - m_1 R)(1-\lambda)\, s. \end{aligned}$$

Since $m_0 = m_1 R$, then $c_0 = 0$ always and so

$$\mathbb{M} = 0,$$

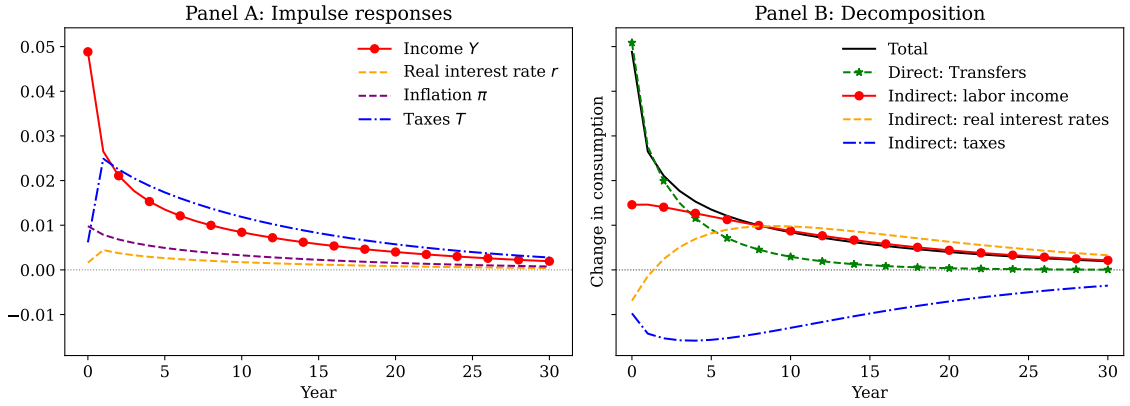
i.e., Ricardian equivalence holds.

D Additional results for Section

D.1 Decomposing the Consumption Response

Figure 6.2 shows that people systematically underestimate the change in economy-wide variables like aggregate output, real interest rates, and inflation. This pattern of expectations lies at the core of the GE dampening factor. In principle, the negative effect of the GE dampening effect associated with sparsity could dominate the positive effect of RNE. However, given our calibration, the latter effect dominates the former effect. Panel B of Figure 6.1 disaggregates the response of total output response into its underlying components: the direct effect of the transfer (depicted by the green dashed line) and the indirect GE effects arising from adjustments in endogenous variables—specifically, equilibrium income (solid red line), real interest rates (yellow dashed line), and lump-sum taxes (blue dotted line). To investigate the impact of a given variable (i.e., transfers, labor income, real interest rates, and lump-sum taxes) on output, we assume that people's expectations of that variable are the same as they were under *sparsity*.

Figure D.1: Impulse Responses and Decomposition of Consumption under Sparsity



Notes: This figure displays the economy's response to a one-time transfer policy. Panel A displays the impulse response function of GDP/income in log-deviations from steady state in the dotted red line, the impulse response function of changes in lump-sum taxes from their steady state level in the dash-dot blue line, and the percentage point changes in inflation in dash purple line and real interest rates in the dash yellow line. Panel B decomposes the response of income into the direct effects of the transfer (starred-dash green lin) and the indirect effects coming from changes in equilibrium labor income (dotted red line), real interest rates (dash yellow line), and taxes (dash blue line). The continuous black line computes the total effect.

People believe that all other aggregate variables are constant at their steady state values. . We then compute the associated change in consumption and and output.

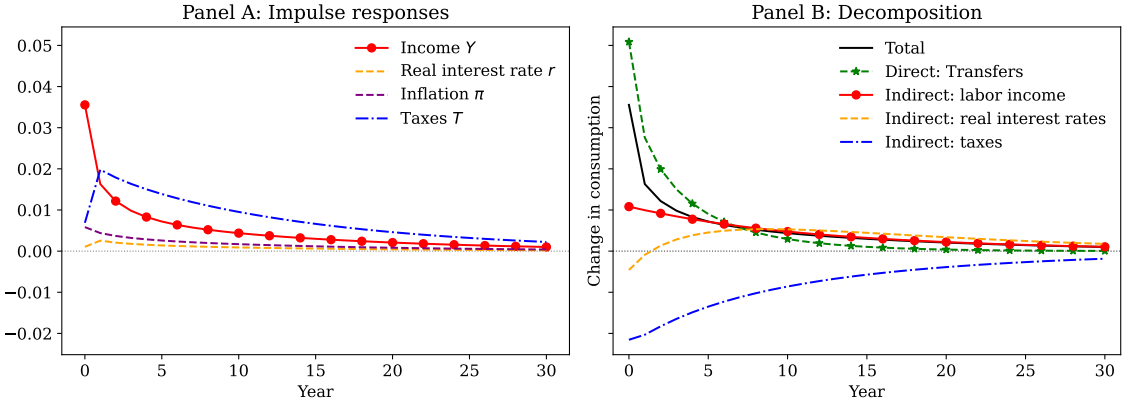
The decomposition shows that, other things equal, an increase in transfer payments increases output both directly but also indirectly via the increase in current as well as expected future labor income. However, other things equal, the anticipation of higher lump-sum taxes reduce the response of aggregate output to the transfer. Anticipated movements in the real interest rate lead initially to a reduction in output but after two years those movements generate a rise in output. On net, the expansionary effects associated with the transfer dominate the negative so that actual output rises at all horizons (see the red line in Panel A).

D.2 The Transfer Multiplier under FIRE

In this appendix, we quantify the GE effects of stimulus transfers under FIRE ($\kappa^{\text{cogn}} = 0$). Even under FIRE, Ricardian Equivalence does not hold in this setting due to the presence of borrowing constraints. Despite the failure of Ricardian Equivalence, we show that the model cannot match the fact that $\mathbb{M} = 0.34$ when people have FIRE.

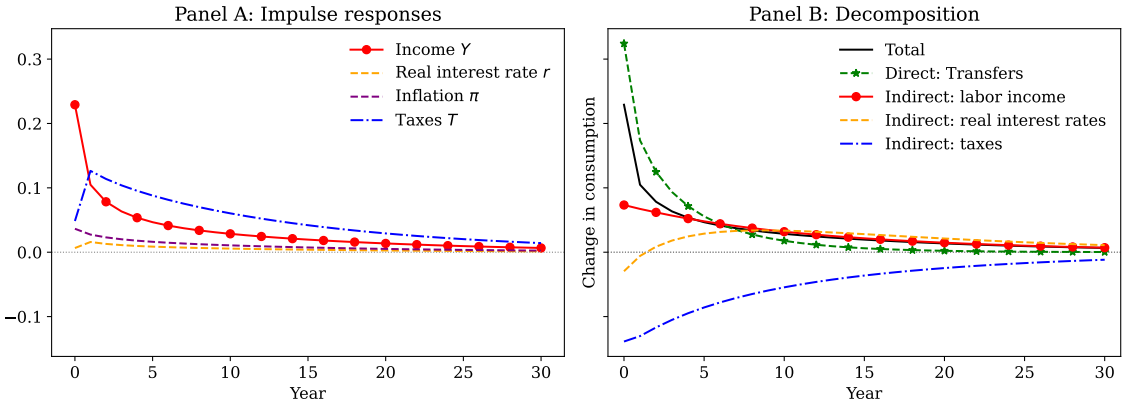
With FIRE, the model implies an impact multiplier on aggregate demand of $\mathbb{M}^* = 0.23$. Panel A of Figure D.3 presents the impulse response functions for output, the real interest rate, and government transfers in response to a one-time stimulus check implemented at date $t = 0$. The figure illustrates that output rises by 0.23 in the first year, accompanied by a 3.6 percentage point increase in inflation. This estimated output multiplier is substantially lower than the average MPC reported in Section 3.

Figure D.2: Impulse Responses and Decomposition of Consumption under FIRE



Notes: This figure displays the economy's response to a one-time transfer policy. Panel A displays the impulse response function of GDP/income in log-deviations from steady state in the dotted red line, the impulse response function of changes in lump-sum taxes from their steady state level in the dash-dot blue line, and the percentage point changes in inflation in dash purple line and real interest rates in the dash yellow line. Panel B decomposes the response of income into the direct effects of the transfer (starred-dash green lin) and the indirect effects coming from changes in equilibrium labor income (dotted red line), real interest rates (dash yellow line), and taxes (dash blue line). The continuous black line computes the total effect.

Figure D.3: Impulse Responses and Decomposition of Consumption with FIRE



To understand why $\mathbb{M}^* < 0.33$, Panel B decomposes the aggregate output response into its constituent components: the direct effect of transfers (green dashed line) and the indirect GE effects arising through adjustments in endogenous variables—namely, equilibrium income (solid red line), real interest rates (yellow dashed line), and taxes (blue dotted line). While higher equilibrium income exerts a positive influence on aggregate demand, this effect is more than offset by contractionary forces. Specifically, the increase in current and anticipated future real interest rates imposes a moderate dampening effect on current demand, whereas the projected rise in future taxes imposes a considerably larger negative effect. These indirect channels jointly attenuate the aggregate demand response to the fiscal transfer, resulting in a GE multiplier substantially below the partial equilibrium MPC.

D.3 The Transfer Multiplier with Real Interest Rate Rule

In this appendix, we explore the implications of assuming a real interest rate rule $r_t = r_t^*$ for the transfer multiplier.

Figure D.4: Impulse Responses and Decomposition of Consumption with Sparsity and Constant Real Interest Rate Rule

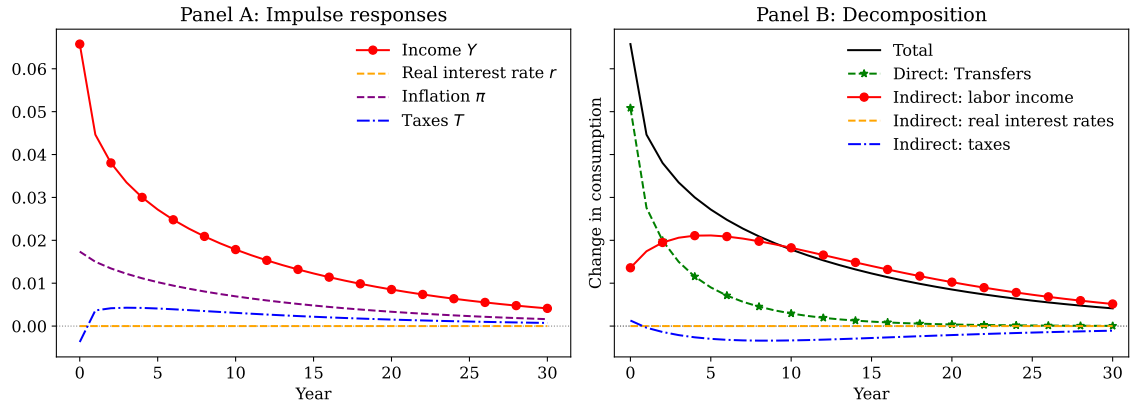
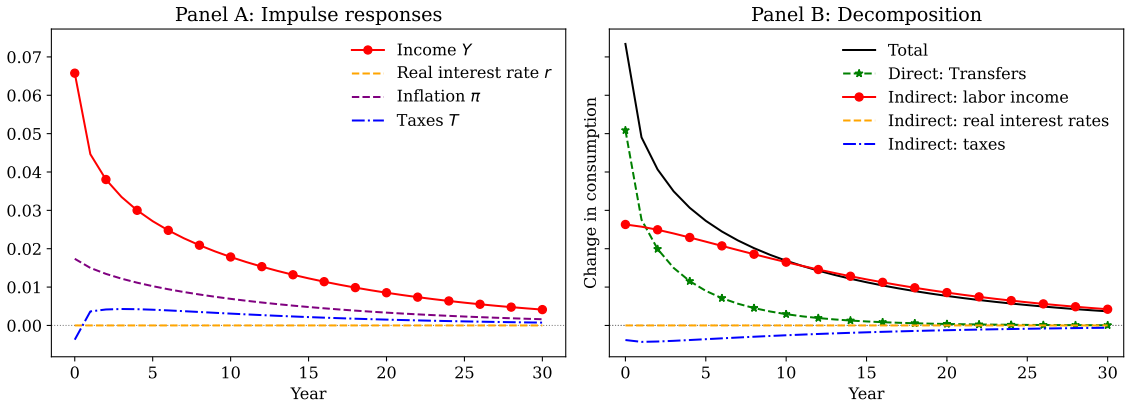
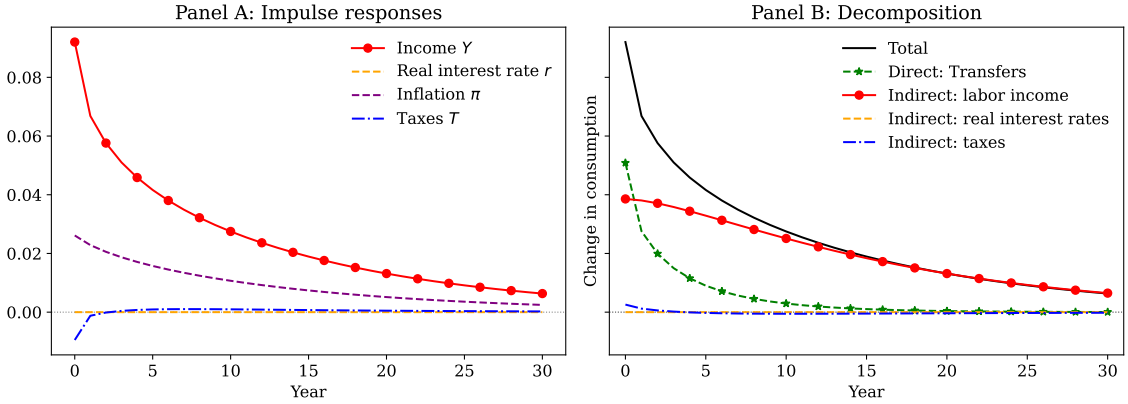


Figure D.5: Counterfactual Consumption Response and Decomposition with FIRE and Constant Real Interest Rate Rule



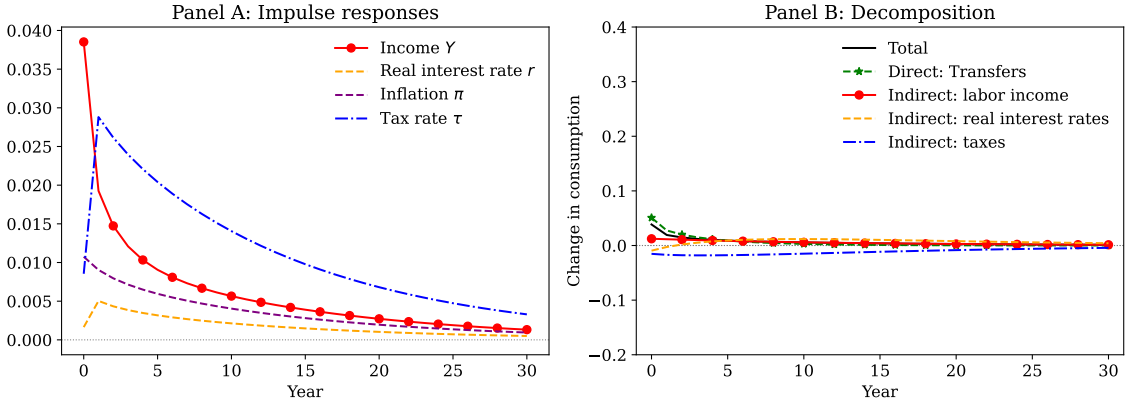
D.3.1 The equilibrium impulse responses under FIRE

Figure D.6: Impulse Responses and Decomposition of Consumption with FIRE and Labor Income Taxes



D.4 The Transfer Multiplier with Distortionary Taxation under FIRE

Figure D.7: Impulse Responses and Decomposition of Consumption with FIRE and Labor Income Taxes



E Survey questionnaire

Bot verification

[Captcha]

Before we begin, please enter your Prolific ID below.

[Text box]

E.1 Consent Form

This is a consent form. Please read and click below to continue.

Study background: This study is conducted by researchers at Northwestern University. Your participation in this research will take approximately 9 minutes.

What happens in this research study: if you decide to participate, you will be asked to complete a series of questions about your perceptions of the state of the economy and how these perceptions influence your spending and savings decisions. You will also answer basic questions about demographics.

Compensation: After completing the survey, you will be redirected to Prolific. You will be paid around $1.8 for completing the survey.

Risks: Your involvement in this study poses no additional risks beyond those encountered daily.

Benefits: Participating in this research offers compensation, as detailed earlier. Additionally, the findings may contribute to society by informing better policymaking.

Voluntary participation: participating in this research is voluntary. You can withdraw from the study at any time.

Confidentiality: We will collect data through a Qualtrics questionnaire overseen by our Research Team. All gathered data will be securely stored in a password-protected Dropbox account dedicated to this research project. Identifiable data will not be collected as part of this study. If you decide to withdraw, any collected data will be permanently deleted. De-identified information from this study may be used for future research or shared with other researchers without your additional informed consent.

Contact: For questions, concerns, or complaints about this research, contact the researchers at fiscal.survey@gmail.com. For inquiries regarding the IRB process for this study, reach out to the Northwestern University IRB team at irb@northwestern.edu.

Agreement to participate: by clicking continue, you indicate that you have read this consent form and voluntarily agree to participate in the study.

E.2 Demographics

1. What is your current age in years?
   [Text box]

2. What gender do you identify as?
   [Male; Female; Non-binary; Prefer no to say; Other. Specify: [Text box]]

3. What is your marital status?
   [Single; Married; Legally separated or divorced; Widowed; Cohabiting/Living with a partner; Other. Specify: [Text box]]

4. In which US state/region do you live in?
   [Alabama; Alaska; Arizona; Arkansas; California; Colorado; Connecticut; Delaware; Florida; Georgia; Hawaii; Idaho; Illinois; Indiana; Iowa; Kansas; Kentucky; Louisiana; Maine; Maryland; Massachusetts; Michigan; Minnesota; Mississippi; Missouri; Montana; Nebraska; Nevada; New Hampshire; New Jersey; New Mexico; New York; North Carolina; North Dakota; Ohio; Oklahoma; Oregon; Pennsylvania; Rhode Island; South Carolina; South Dakota; Tennessee; Texas; Utah; Vermont; Virginia; Washington; West Virginia; Wisconsin; Wyoming; Puerto Rico; District of Columbia; Other US region; I live outside of the USA]

5. Please tell us how many of the following people usually live in your primary residence besides yourself (including those temporarily away):
   [Spouse/partner; Children; Other relatives; Non-relatives]

6. How would you describe your ethnicity/race?
   [White; Hispanic/Latino; Black or African American; Native American/Alaska Native; Asian; Native Hawaiian or Other Pacific Islander; Other. Please specify: [Text box]]

7. Which of the following best describes the financial decision-making process in your household?
[Someone else in my household makes all financial decisions; I share financial decisions with someone else in my household; I make all financial decisions myself]

8. What is the highest level of education you have completed?
[No formal qualifications; Secondary education (e.g. GED/GCSE); High school diploma; Technical/community college; Undergraduate degree (BA/BSc/other); Graduate degree (MA/MSc/MPhil/other); Doctorate degree (PhD/other); Don't know / not applicable]

9. What is your employment status?
[Full-time; Part-time; Due to start a new job within the next month; Unemployed (and job-seeking); Not in paid work (e.g., homemaker, retired, or disabled); Other (please specify)]

9. Generally speaking, what do you consider to be your political affiliation?
[Republican; Democrat; Independent/Non-affiliated; Other. Specify: [Textbox]]

10. [If 3 is "Married" or "Cohabiting/Living with a partner"] What is your spouse/partner's current employment status
[Full-time; Part-time; Unemployed (and job-seeking); Not in paid work (e.g.; homemaker, retired, or disabled); Other. Specify: [Textbox]]

E.3 Attention Check

1. People often rely on various sources for economic news and updates. To confirm that you're paying attention, please select ABC News regardless of which sources you actually use. When there is a big news story, which website would you visit first? (Please only choose one)
[The Drudge Report; ABC News; Fox News; New York Times website; Washington Post website; National Public Radio (NPR) website]

E.4 Expectation Questions – First Stage

People's expectations are an important determinant of their spending decisions. There are no right or wrong answers to the following questions about your expectations.

1. By what percentage do you expect your total household's pre-tax income to change in the following periods? By pre-tax income we mean your income before you pay any taxes. Please write your answer in percent; For example, if you expect your household income to increase by x% relative to your current household income, input x; if you expect it to decrease by x% input -x; if you expect your household income to remain constant, input 0.
[Between Jan 1, 2025 and Dec 31, 2025: [Text box]; Between Jan 1, 2026 and Dec 31, 2026: [Text box]; Between Jan 1, 2030 and Dec 31, 2030: [Text box]]

2. By what percentage do you expect your total household's federal taxes to change in the following periods? Please write your answer in percent; For example, if you expect your federal taxes to increase by x% relative to your current federal taxes, input x; if you expect it to decrease by x% input -x; if you expect your federal taxes to remain constant, input 0.
   [Between Jan 1, 2025 and Dec 31, 2025: [Text box]; Between Jan 1, 2026 and Dec 31, 2026: [Text box]; Between Jan 1, 2030 and Dec 31, 2030: [Text box]]

3. What do you expect the inflation rate to be in the following periods? [The annual inflation rate measures how much prices in the economy rise from year to year.] Please write your answer in percent; if you mean x%, input x.
   [Between Jan 1, 2025 and Dec 31, 2025: [Text box]; Between Jan 1, 2026 and Dec 31, 2026: [Text box]; Between Jan 1, 2030 and Dec 31, 2030: [Text box]]

4. What do you expect the average interest rate on one-year Treasury bills to be in the following periods? [The one-year Treasury bill rate reflects the yield received from investing in a U.S. government-issued security with a one-year maturity.] Please write your answer in percent; if you mean x%, input x.
   [Between Jan 1, 2025 and Dec 31, 2025: [Text box]; Between Jan 1, 2026 and Dec 31, 2026: [Text box]; Between Jan 1, 2030 and Dec 31, 2030: [Text box]]

E.5 Eliciting the Marginal Propensity to Consume

[In this section, participants were randomly assigned to one of 3 possible hypothetical transfer scenarios: Government Rebate, Government Transfer Policy, and Government Transfer Policy + Information]

Please answer the remaining questions in the survey assuming that you are in the following scenario:

[1. Government Rebate] In this scenario your household receives a one-time unexpected cash transfer of $1,400 from the government today. You know that no other household will receive such a payment. We are interested in understanding how you would use this additional cash.

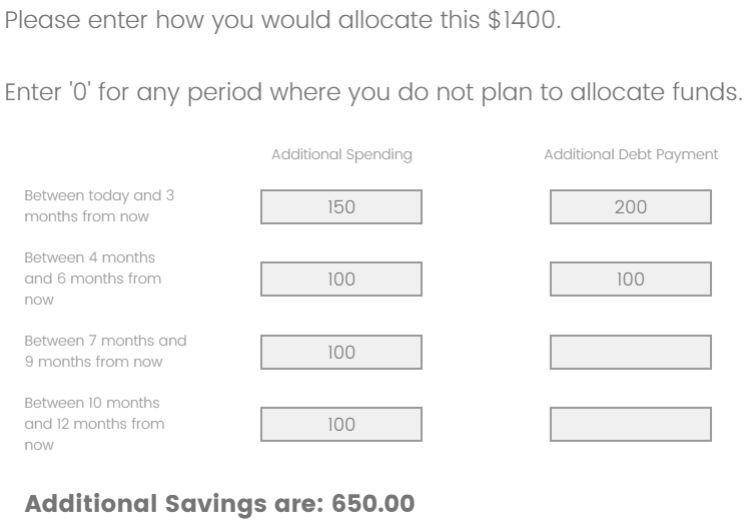
[2. Government Transfer Policy] In this scenario the government sends a one-time unexpected cash transfer of $1,400 to every household in the USA today, including yours. We are interested in understanding how you would use this additional cash.

[3. Government Transfer Policy + Information] In this scenario, the government sends a one-time unexpected cash transfer of $1,400 to every household in the USA today, including yours. To finance this deficit, the government will raise your taxes by $1,400 next year. We want to understand how you would use the $1,400 transfer today.

There are 3 ways your household could use this additional income:

- Additional spending: purchases of durable goods (e.g., cars, furniture, jewelry, etc.) or non-durable goods and services (e.g., food, clothes, vacation, etc.) in addition to those you already planned to purchase.
- Additional debt repayments: principal and interest payments to reimburse outstanding debt (e.g., credit card debts, mortgages, student and consumer loans, etc.) in addition to those you already planned to make.
- Additional Savings: the additional income that is neither spent nor used to repay debt.

Please enter how you would allocate this $1400. Enter '0' for any period where you do not plan to allocate funds.
[We next display an image of the matrix displayed to answer this.]



E.6 Expectation Questions

[Next, we elicit people's expectations after the cash transfer. The prompt depends on which scenario people received, but the questions are the same across scenarios.]

[If Government Rebate:] Now, we would like to understand your expectations about income, taxes, inflation, and interest rates in the scenario previously discussed (the government's cash transfer of $1,400 only to your household).

[If Government Transfer Policy and Government + Tax Information:] Now, we would like to understand your expectations about income, taxes, inflation, and interest rates in the scenario previously discussed (the government's cash transfer of $1,400 to all households).

Please fill out the same tables again incorporating that impact (if any) into your answers.

1. By what percentage do you expect your total household's pre-tax income to change in the following periods? By pre-tax income we mean your income before you pay any taxes. Please write your answer in percent; For example, if you expect your household income to increase by x% relative to your current household income, input x; if you expect it to decrease by x% input -x; if you expect your household income to remain constant, input 0.
   [Between Jan 1, 2025 and Dec 31, 2025: [Text box]; Between Jan 1, 2026 and Dec 31, 2026: [Text box]; Between Jan 1, 2030 and Dec 31, 2030: [Text box]]

2. By what percentage do you expect your total household's federal taxes to change in the following periods? Please write your answer in percent; For example, if you expect your federal taxes to increase by x% relative to your current federal taxes, input x; if you expect it to decrease by x% input -x; if you expect your federal taxes to remain constant, input 0.
   [Between Jan 1, 2025 and Dec 31, 2025: [Text box]; Between Jan 1, 2026 and Dec 31, 2026: [Text box]; Between Jan 1, 2030 and Dec 31, 2030: [Text box]]

3. What do you expect the inflation rate to be in the following periods? [The annual inflation rate measures how much prices in the economy rise from year to year.] Please write your answer in percent; if you mean x%, input x.
   [Between Jan 1, 2025 and Dec 31, 2025: [Text box]; Between Jan 1, 2026 and Dec 31, 2026: [Text box]; Between Jan 1, 2030 and Dec 31, 2030: [Text box]]

4. What do you expect the average interest rate on one-year Treasury bills to be in the following periods? [The one-year Treasury bill rate reflects the yield received from investing in a U.S. government-issued security with a one-year maturity.] Please write your answer in percent; if you mean x%, input x.
   [Between Jan 1, 2025 and Dec 31, 2025: [Text box]; Between Jan 1, 2026 and Dec 31, 2026: [Text box]; Between Jan 1, 2030 and Dec 31, 2030: [Text box]]

E.7 Economic Information on the Household

Next, we want to understand more about your household's economic situation. By household, we mean the people who usually live in your primary residence (including yourself), excluding roommates and renters.

1. Which category below represents the total combined pre-tax income of all household members (including you) during the past 12 months?
   [Less than $10,000; $10,000 to $19,999; $20,000 to $29,999; $30,000 to $39,999; $40,000 to $49,999; $50,000 to $59,999; $60,000 to $74,999; $75,000 to $99,999; $100,000 to $149,999; $150,000 to $199,999; $200,000 to $249,999; $250,000 or more.]

2. Which illiquid assets do the people in your household (including you) have?
[Real estate properties; Vehicles; Retirement Accounts (401k,403b, 457, IRA, thrift savings plans, etc.); Private ownership of farms/businesses; Insurance holdings; None of the above]

3. What is your household's net illiquid wealth? Net illiquid wealth is equal to the sum of the value of all the illiquid assets that your household owns minus the value of any outstanding loans associated with these illiquid assets (e.g., mortgages, car loans, farm/business loans). Note that the value of your net illiquid wealth may be negative if the value of the associated outstanding loans exceeds that of your illiquid assets.
[Less than -$50,000; -$49,999 to -$30,000; -$29,999 to -$20,000; -$19,999 to -$10,000; -$9,999 to -$5,000; -$4,999 to -$2,000; -$1,999 to -$1,000; -$999 to -$500; -$500 to $0; $0 to $500; $500 to $999; $1,000 to $1,999; $2,000 to $4,999; $5,000 to $9,999; $10,000 to $19,999; $20,000 to $29,999; $30,000 to $49,999; $50,000 to $99,999; $100,000 to $249,999; $250,000 to $499,999; $500,000 to $749,999; $750,000 to $999,999; $1,000,000 or more.]

4. Which liquid assets do the people in your household (including you) have? Please do not include any investments in retirement accounts (401k,403b, 457, IRA, thrift savings plans, etc.) or employer-sponsored pensions.
[Checking account or cash; Savings accounts; Money market funds; CDs (Certificates of Deposit); Government/Municipal Bonds or Treasury Bills; Stocks or bonds in publicly held corporations, stock or bond, mutual funds, or investment trusts (held outside of 401 k's); Cryptocurrency; None of the above]

5. Which of the following types of debt do the people in your household (including you) have?
[Credit card debt; Student loans; Personal loans; Other debt; None of the above]

5. What is your household's net liquid wealth? Net liquid wealth is equal to the sum of the value of all the liquid assets that your household owns minus the value of any outstanding debt (excluding mortgages, car loans and farm/business loans). Remember that liquid asset categories are checking accounts or cash, savings accounts, money market funds, CDs, Government/Municipal Bonds or Treasury Bills, Stocks or bonds in publicly held corporations, mutual funds, or investment trusts. Debt categories you should include are Credit card debt, Student loans, Personal loans, and Other debt (unrelated to illiquid assets).
[Less than -$50,000; -$49,999 to -$30,000; -$29,999 to -$20,000; -$19,999 to -$10,000; -$9,999 to -$5,000; -$4,999 to -$2,000; -$1,999 to -$1,000; -$999 to -$500; -$500 to $0; j. $0 to $500; $500 to $999; $1,000 to $1,999; $2,000 to $4,999; $5,000 to $9,999; $10,000 to $19,999; $20,000 to $29,999; $30,000 to $49,999; $50,000 to $99,999; $100,000 to $249,999; $250,000 to $499,999; $500,000 to $749,999; $750,000 to $999,999; $1,000,000 or more.]

6. When you review or plan for your household's regular spending and savings, how far in advance do you usually try to plan for?

[Between 2 and 4 weeks; Between 1 and 2 months; Between 2 and 3 months; Between 3 and 6 months; Between 6 and 9 months; Between 9 and 12 months; More than 12 months]

E.8 How informed individuals are?

Next, we are interested in your individual views and perceptions of the US economic and fiscal situation.

1. What do you think the Federal Spending was, as a percentage of Gross Domestic Product, in 2023? [Annual gross domestic product (GDP) is the market value, measured in dollars, of all final goods and services produced by a country in a given year.] Please write your answer in percent; if you mean x%, input x.
   [Text box]

2. What do you think the Tax Revenue was, as a percentage of Gross Domestic Product, in 2023? [Tax revenue is the income that the federal government collects from taxes imposed on individuals, businesses, and other entities.] Please write your answer in percent; if you mean x%, input x.
   [Text box]

3. What do you think the Federal Debt was, as a percentage of Gross Domestic Product, in 2023? [The federal debt is the total amount the government owes, as a percentage of GDP.] Please write your answer in percent; if you mean x%, input x.
   [Text box]

4. What is the Federal Reserve Bank's target inflation rate over the long run? [The rate of inflation that the central bank aims to achieve and maintain over the long run.] Please write your answer in percent, if you mean x%, input x.
   [Text box]

5. How many hours a week do you usually spend gathering information about the US economy?
   [Text box]

6. What is your primary source of news about national issues:
   [WSJ, Other national newspapers, Local newspapers, CNN, Fox News, MSNBC, Other television broadcasts; Radio; Social media, including podcasts; Washington Post; X (formerly Twitter); Other. Specify: [Text box]]

E.9 Feedback

Thank you for participating in this survey. In this section, we kindly request your feedback on your experience to improve this survey for future iterations.

1. How easy/difficult was it to respond to the questions in this survey?
   [Very easy; Easy; Neutral; Difficult; Very Difficult]

2. If you selected difficult or very difficult above, please tell us some examples of how we can make it easier to respond to this survey?
   [Text box]

We thank you for your time spent taking this survey. Please click next to be redirected back to Prolific and register your submission.