Ricardian Non-Equivalence*

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Abstract

This paper presents new survey evidence on how household spending responds to fiscal transfers. Our key finding is that the planned propensity to spend out of transfers equals the marginal propensity to consume (MPC), implying that households do not incorporate future tax liabilities into their spending plans. The canonical HANK model cannot account for this evidence because households are overly sensitive to future taxes. We develop an extended HANK model in which households are partially inattentive to future tax liabilities and to general equilibrium effects of fiscal policy. This inattention dampens forward-looking intertemporal MPCs and increases transfer and spending multipliers.

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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 (NK) models (e.g., Woodford, 2003b, Galí, 2008, and Christiano, Eichenbaum, and Evans, 2005). While this result provides a useful theoretical benchmark, it is well understood that a variety of empirical and institutional considerations can cause Ricardian Equivalence to fail. 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 Ricardian Equivalence on the grounds that people do not incorporate changes in future tax liabilities arising from government transfers into their decisions. For example, he 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): the idea that households do not fully internalize future tax liabilities when making current spending decisions.[2] We proceed in four steps. First, we design and implement survey-based experiments to measure how people respond to government transfers and the degree to which they incorporate future tax liabilities into their spending plans. Our key findings provide strong support for RNE: people's planned propensity to spend out of transfers equals their marginal propensity to consume (MPC). Second, we argue that our empirical findings pose a challenge to models that assume people have full information and rational expectations (FIRE), including models that incorporate borrowing constraints and incomplete

[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) also 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). Gabaix (2020), Woodford and Xie (2022), and Bianchi-Vimercati, Eichenbaum, and Guerreiro (2024) model limited foresight or limited understanding of the government budget constraint as a source of RNE.

markets. Third, we extend the canonical Heterogeneous-Agent New Keynesian (HANK) framework of Auclert et al. (2024b,a) to incorporate inattention to future tax liabilities and the response of aggregate variables to a fiscal policy shock. Inattentive consumers are less responsive to future tax liabilities and other general-equilibrium (GE) consequences of a transfer. The first force increases the contemporaneous spending response while the second force attenuates that response.

Finally, we show that in a calibrated version of the *inattentive HANK* model the first effect dominates the second effect. This property enables the model to account for our survey-based findings. Moreover, the transfer and government spending multipliers in this model are substantially larger than the corresponding multipliers in the canonical HANK model. The magnification effects are particularly strong in environments where MPCs are high.[3]

We now discuss these four steps in greater detail.

Survey Results Section 2 discusses the results of a survey that we conducted from December 2024 to September 2025, with 99% of our responses obtained by January 2025. We use survey experiments to estimate households' consumption responses to hypothetical government transfers, using the survey methodology developed by Colarieti, Mei, and Stantcheva (2024).[4] Each respondent is randomly assigned to one of three hypothetical experiments: (E1) they receive an individual \$1,400 tax rebate that, by design, has no aggregate fiscal implications; (E2) a universal \$1,400 transfer to all U.S. households, including theirs, that gives rise to an increase in government deficits; and (E3) the same universal transfer as E2, coupled with information that their personal future taxes will rise to offset the current deficit. We use the change in people's planned spending in experiment E1 to estimate their MPC, and the change in planned spending in experiments E2 and E3 to estimate their planned propensity to spend out of transfers.

Our central finding is that the fraction of aggregate transfers that people plan to spend is essentially the same as the marginal propensity to spend out of individual transfers, i.e., the planned propensity to spend is the same in experiments E1 and E2.[5] This finding indicates that people do not incorporate the implications of future taxes into their current spending decisions. When we explicitly inform people about the rise in their future taxes,

[3] In Appendix G, we develop a tractable HANK model in which we can formally prove that the general equilibrium consequences of RNE are amplified with higher values of the MPC.

[4] These authors argue that survey-predicted MPCs are reliable estimates of actual observed actions.

[5] In reporting results, we focus on the average propensity to spend, since that is the key object for our model. In Appendix Figure A.4 we show that the entire cross-sectional distribution of planned spending propensities is essentially indistinguishable between these two experiments.

experiment E3, the average propensity to spend out of the transfer falls but is still far from the value of zero that would obtain under Ricardian Equivalence.

We also elicit people's expectations of future tax liabilities at horizons of one, two, and six years. Expectations are essentially the same in scenarios E1 and E2. In scenario E3, people revise their expectations of future tax liabilities upward.

Taken together, these findings support the view that RNE fails because people do not incorporate the future tax implications of aggregate transfers into their spending plans.

HANK Model under FIRE Section 4 analyzes the effects of a government transfer in the canonical FIRE-based HANK model (see Auclert et al. 2024b,a). The model incorporates standard reasons why Ricardian Equivalence does not hold, e.g., incomplete markets, borrowing constraints, and distortionary taxation.

We calibrate the model so that the annual average MPC equals the value in our survey experiment E1. We simulate the effects of fiscal transfers on household spending plans. In the baseline simulation, we assume that the government raises future lump-sum taxes to pay for these transfers. We find that the model-implied planned spending response is significantly lower than the corresponding value of our survey-based empirical estimate. The anticipation of higher future taxes associated with the transfers exerts substantial downward pressure on spending plans, reducing the overall propensity to spend out of transfers by 47 percent. Similar quantitative findings hold as we vary the persistence of the government debt associated with the transfers. The results also hold if the government raises income taxes rather than lump-sum taxes to finance the transfer.

In Appendix D.4, we also show that the canonical HANK model is also inconsistent with our survey results when monetary policy keeps the real interest rate constant, the government finances transfers by lowering government spending, as well as for a case in which the government keeps debt elevated for up to 10 years before raising taxes.

Taken together, our findings show that the canonical FIRE-based HANK model cannot account for the magnitude of the spending response to transfers observed in our micro-evidence. This result underlies our interest in analyzing the effects of fiscal policy in the inattentive HANK model.

Inattentiveness: A Solution The primary reason that the canonical HANK model understates the propensity to spend out of transfers is the assumption that households have fully-informed and rational expectations. This assumption implies that people's spending plans are too sensitive to the future taxes associated with transfers. To address this shortcoming, we embed inattention into the canonical HANK model using the cognitive-discounting framework of Gabaix (2020).[6]

Introducing inattention into the HANK model gives rise to two important effects: (i) it breaks Ricardian Equivalence, because people do not accurately forecast future taxes, and (ii) it attenuates general-equilibrium feedback mechanisms because people do not accurately forecast the aggregate effects of fiscal policy. The first effect raises household spending in response to transfers, while the second effect generally dampens spending responses by weakening households' sensitivity to changes in equilibrium income and prices.[7] For moderate degrees of inattention, the first effect dominates, so that people's planned propensity to spend out of aggregate transfers is larger than under FIRE. A calibrated version of the inattentive HANK can account for our finding that people's planned propensity to spend out of aggregate transfers equals their MPC.

We also show that, in contrast to the HANK model, calibrated versions of Representative-Agent or Two-Agent New Keynesian models (respectively, RANK and TANK) cannot be rendered consistent with our survey results. This result obtains whether or not we allow for inattention. That is why we focus our analysis on the aggregate effects of fiscal policy using the inattentive HANK model.

We find that inattention increases the transfer multiplier by 26 percent relative to the FIRE-based HANK model. A formal decomposition of the multiplier establishes that the increase induced by inattention primarily reflects households' failure to internalize future tax liabilities. The impact of the GE-dampening effect is relatively modest because the effect of inattention to aggregate income and interest rates largely cancel each other out.

We also study the effects of inattention on the impact of deficit-financed government spending shocks on aggregate activity. Under FIRE, the model yields a first-year multiplier of 0.95, so that aggregate consumption *falls* after an increase in government purchases. By contrast, under inattention, the multiplier rises to 1.08, so that aggregate consumption *rises* after an increase in government purchases. As with transfers, the key mechanism underlying this result is the failure of inattentive households to incorporate the present value of higher future taxes into their current consumption decisions.

[6] Despite the additional complexity associated with this departure from FIRE in a HANK framework, the model remains tractable using recent advances in sequence-space methods as developed in Auclert, Rognlie, and Straub (2020).

[7] The role of bounded rationality in dampening general equilibrium channels has been extensively studied in the literature. See Angeletos and Lian (2023) for a comprehensive review.

1.1 Related Literature

This paper contributes to the literature on the economic effects of fiscal deficits when Ricardian Equivalence does not hold. We focus on departures driven by people's 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 reason for the failure of Ricardian Equivalence. Our key theoretical contribution is to extend this analysis beyond the RANK framework, demonstrating how agent heterogeneity and bounded rationality interact to amplify the transfer multiplier. This result is complementary to the results in Farhi and Werning (2019) and Angeletos and Huo (2021). However, their results pertain to the GE dampening effect on the economy's response to shocks. Our analysis shows that inattention to future taxation amplifies the effects of fiscal policy.

Our modeling approach is based on the cognitive-discounting framework of Gabaix (2020). The key insights extend to other models of inattention, including noisy information rational expectations (e.g., Lucas Jr, 1972, and Woodford, 2003a), rational inattention (e.g. Sims, 2003, and Maćkowiak, Matějka, and Wiederholt, 2023), behavioral inattention/sparsity (e.g. Gabaix 2014, 2019), and sticky expectations frameworks (e.g. Mankiw and Reis, 2002, Carroll et al., 2020, and Auclert et al., 2020). In Appendix C.6, we show that RNE can be generated in these different models of inattention. We also show that RNE can be microfounded using other forms of bounded rationality, including 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 (García-Schmidt and Woodford, 2019), limited foresight (e.g., Woodford, 2019 and Woodford and Xie, 2019, 2022), and policy function uncertainty (e.g., Ilut and Valchev, 2023, and Enke et al., 2024).[8]

By studying the effects of fiscal transfers in an inattentive HANK model, we contribute to the broader literature on heterogeneous-agent models featuring 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 for 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

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

implications for the monetary policy transmission mechanism. Bardóczy and Guerreiro (2023) develop a HANK model with search-and-matching frictions and study the impact of unemployment benefits on economic activity with imperfect expectations, using data on expectations. Guerreiro (2023) studies the consequences of heterogeneous beliefs in HANK economies across a large variety of shocks.

Empirically, our paper contributes to the growing use of survey data to quantify behavioral mechanisms in macroeconomic models (e.g., Roth and Wohlfart, 2020, Coibion et al., 2022, 2023, and Stantcheva, 2023). Our measurement of MPCs from survey data follows the methodology in Colarieti, Mei, and Stantcheva (2024) and connects to 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). A distinctive feature of our contribution is that we compare spending responses to idiosyncratic transfers with responses to aggregate transfers, allowing us to assess whether households internalize the future tax implications of deficit-financed fiscal policy. In contemporaneous work, Adams and Matthes (2026) develop a method to estimate how aggregate consumption responds to transfers using macro data. They also find that deviations from FIRE are a key reason for the failure of Ricardian Equivalence.

Outline The paper is organized as follows. Section 2 discusses the details of the survey. Section 3 discusses the conceptual framework underlying the survey design and our empirical findings. Section 4 describes our HANK model under FIRE and our calibration of that model. We show that this model is robustly inconsistent with our empirical findings from experiment E2. Section 5 extends the HANK model to incorporate inattention. We show that this version of the model is consistent with our empirical findings. Section 6 shows that alternative models, namely RANK or TANK models, with or without inattention, cannot be rendered consistent with our survey findings. Sections 7 and 8 discuss the contribution of RNE in the inattentive HANK model to the overall government transfer and spending multipliers, respectively. We conclude in Section 9. The Appendix contains proofs, additional empirical and quantitative analyses, the additional tractable HANK model which derives additional theoretical insights, and the survey questionnaire.

2 Survey Design

We conducted 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 2024 and September 2025. Almost all of our responses (99%) were collected between December 2024 and January 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 imposed sample targets based on gender, education, and political affiliation. We computed gender and education targets using data from the November 2024 Current Population Survey.[9] Political affiliation targets were computed based on Gallup data from October 2024. On average, participants spent 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 B.1 presents a comparison between the characteristics of our sample and those of the broader U.S. population. The sample is broadly representative, though it exhibits a modest over-representation of younger and unemployed individuals, and a slight under-representation of white individuals. Appendix C.3 shows that our empirical results are robust to re-weighting the sample to more closely align with the demographic composition of the U.S. population.

Our survey is mainly composed of closed-ended questions. Following best practices, we generally include an "Other" option and a box for open-ended answers (Stantcheva, 2023). As discussed before, we randomly assigned respondents to one of three hypothetical experiments: (E1) the benchmark case in which people receive an idiosyncratic tax rebate of $1,400, a scenario has no aggregate fiscal implications; (E2) a universal transfer of $1,400 to all U.S. households, a scenario which does have implications for future taxes; and (E3) the same universal transfer, but respondents are informed they will have to pay more taxes in the future. The first experiment enables us to compute the marginal propensity to consume, while the second and third experiments allow us to compute people's planned propensity to spend when the policy has fiscal and aggregate consequences.

In the literature, it is standard to estimate MPCs using data from lotteries (Fagereng et al., 2021). In pretests of our survey, we experimented with alternative scenarios in which the cash transfer in experiment E1 was framed as coming from winning a lottery. We found that the responses to those questions and the responses in experiment 1 are very similar. Based on this evidence, we excluded the non-government transfer scenario

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

from the main survey. Appendix H contains the full questionnaire.

2.1 How Well-Informed are People about General Economic Conditions?

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

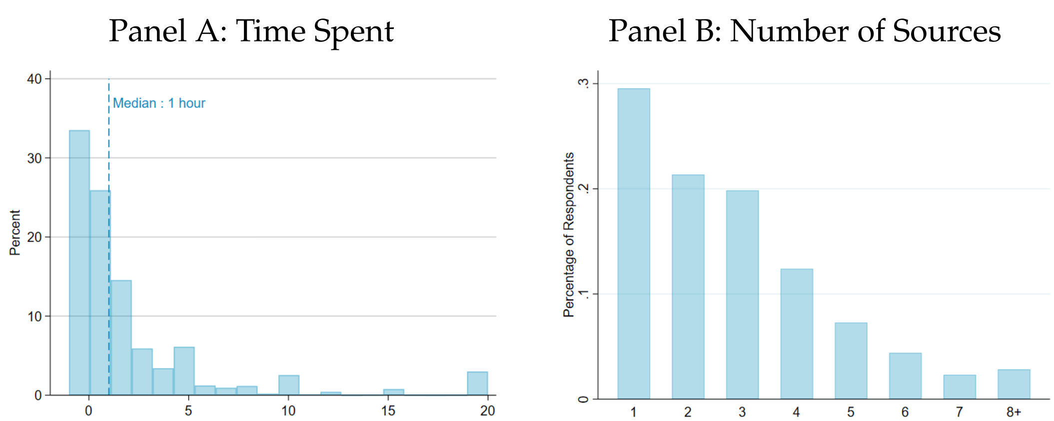

Figure 2.1: Information Acquisition

Notes: Panel A 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?" In the figure, the data from the responses were winsorized at 0 and 20 hours, replacing values below 0 with 0 and values above 20 with 20 to generate a more interpretable range. Panel B 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.

People spend little time obtaining information about the US fiscal situation We asked respondents how many hours per week they typically spend gathering information about the US economy. Figure 2.1 Panel A shows the distribution of the responses. The median time spent acquiring information is one hour per week. Over 70 percent of respondents report that they spend fewer than 2 hours a week gathering news.

People rely on a small number of information sources We asked respondents to report the number and types of sources from which they usually obtain information about the US economy. Figure 2.1 Panel B displays the distribution of the number of sources our survey respondents used. The median person receives information from fewer than two sources. Almost 30 percent report using only one information source.

Appendix Figure A.1 shows the types of sources from which survey respondents obtain information about the US economy. Strikingly, 70 percent of people report obtaining news from social media (X plus other social media). The next important two sources of news are the two cable news channels, CNN and Fox News.

People misperceive the current U.S. fiscal situation We asked respondents about the magnitude of three key fiscal indicators in 2023. Figure 2.2 displays the distribution of perceptions about the ratio of the U.S. federal debt of GDP.

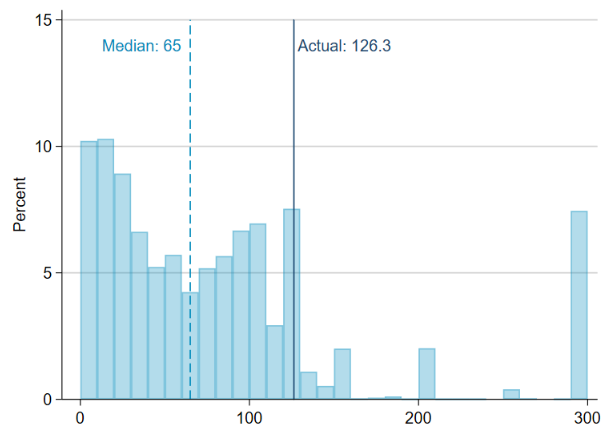

Figure 2.2: Perceptions of the Ratio of US Federal Debt to GDP

Notes: This figure presents the distribution of responses to the question "What do you think federal debt was, as a percentage of GDP, in 2023?" In the figure, the data have been top-coded at 300 percent, setting all values above 300 to 300. The median estimates provided by respondents are indicated with dashed lines, while the actual values are represented by solid lines.

Figure 2.2 shows large dispersion in people's perceptions. Most people make large mistakes about the size of the federal-debt to GDP ratio. The vast majority of people substantially underestimate that ratio: the median and mean perception of the ratio are 65 percent and 75.4 percent, respectively. The actual size of that ratio in 2023 was 118.60 percent.[10] Only about 13.8 percent of respondents think that the ratio is equal to or greater than its actual level.

[10]The portion of the debt held by the public is equal to 94.33 percent of GDP

Panels A and B of Figure A.2 in the Appendix display the distribution of perceptions about federal spending and taxes, respectively. The median person slightly overestimates federal spending and underestimates tax revenue. The average response is substantially higher than the actual value of both indicators. The average person thought that the ratios 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. Figure A.3 in the Appendix also displays the respondents' perceptions of the Federal Reserve's inflation target.

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 spending plans. We use the survey results to estimate individuals' propensity to spend out of a cash transfer under three distinct hypothetical scenarios: (E1) an individual cash transfer, (E2) a universal transfer distributed to all households in the U.S. economy, and (E3) a universal transfer accompanied by explicit information that future tax increases will offset the cost of the universal transfer. People's responses in these hypothetical scenarios correspond to their spending plans absent any other observations of how the economy would respond to the transfers. For this reason, we refer to these responses as their *planned spending responses* to the transfers.

3.1 A Simple Model of Ricardian Non-Equivalence

To motivate our empirical analysis, it is useful to consider a stylized spending-saving framework. Consider a simple model in which 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 the household faces no income uncertainty. Consumers 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

$$C_0 + B = Y_0 - T_0 + \varepsilon_0, \tag{3.2}$$

$$C_1 = Y_1 - T_1 + (1+r)B. \tag{3.3}$$

Here B denotes the household's savings at time 0, ε_0 denotes a transfer from the government, T_0 and T_1 denote taxes at time 0 and 1, respectively, and r denotes the real interest rate. Taxes and transfers satisfy the government budget constraint, so $dT_1/d\varepsilon_0 = (1+r)$. Note that the household must forecast T_1 to solve its problem. We summarize the impact of the transfer policy on spending by the propensity to spend out of the transfer, denoted $dC_0/d\varepsilon_0$. To ease the exposition, we treat Y_0, Y_1, and r as exogenous in this simple model.

Spending Behavior under FIRE Under FIRE, the consumer observes ε_0 and forecasts the change in future tax liabilities perfectly. The consumer's time 0 propensity to spend out of the transfer can be decomposed as follows:

$$\frac{dC_0}{d\varepsilon_0} = m_0 - m_1 \cdot \frac{dT_1}{d\varepsilon_0}. \tag{3.4}$$

The propensity to spend out of a transfer is equal to the MPC out of current income, m_0, minus the intertemporal MPC, m_1, times the change in future taxes, $dT_1/d\varepsilon_0$. As in Auclert, Rognlie, and Straub (2024b), the MPCs m_t are *partial-equilibrium* objects which summarize the individual's time 0 spending response to an additional unit of income at time t, i.e., $m_t = \partial C_0/\partial Y_t$. Intuitively, upon receiving a transfer, individuals increase current consumption by an amount proportional to the marginal propensity to consume (MPC), m_0. Anticipating future tax liabilities, they adjust their spending today in anticipation of future taxes, an effect captured by the term $m_1 \cdot dT_1/d\varepsilon_0$. Equation 3.4 allows us to interpret the Ricardian Equivalence theorem in terms of the magnitude of intertemporal MPCs. Appendix C.5 provides analytic expressions for m_0 and m_1.

Theorem 1 (Ricardian Equivalence Theorem)**.** *In this model, the MPCs satisfy* $m_1 = \frac{m_0}{1+r}$. *Then,*

$$\frac{dC_0}{d\varepsilon_0} = m_0 - m_1 \cdot \frac{dT_1}{d\varepsilon_0} = m_0 - \frac{m_0}{1+r} \cdot (1+r) = 0.$$

This theorem shows how Ricardian Equivalence arises from the relationship between intertemporal MPCs: the decline in future disposable income induced by anticipated taxation exactly offsets the stimulative effect of the transfer at time 0, yielding a zero net impact on aggregate consumption.

Spending Behavior under Inattention We now illustrate how imperfect anticipation of future taxes breaks Ricardian Equivalence and increases people's propensity to spend government transfers. In reality, consumers must wrestle with the complex problem of forecasting future taxes and incorporating those forecasts into current spending decisions. To reflect this complexity, we adopt a model of inattention in which people do not fully internalize the effects of future taxation.

For arbitrary expectations regarding future taxation, $E_0\left[\frac{dT_1}{d\varepsilon_0}\right]$, the planned spending response to a transfer is given by

$$\frac{dC_0}{d\varepsilon_0} = m_0 - m_1 \cdot E_0\left[\frac{dT_1}{d\varepsilon_0}\right]. \tag{3.5}$$

Under FIRE, expectations are model-consistent, i.e., $E_0\left[\frac{dT_1}{d\varepsilon_0}\right] = \frac{dT_1}{d\varepsilon_0} = 1 + r$.

To capture inattention, we introduce a parameter λ that generates a cognitive wedge in consumers' expectations:

$$E_0\left[\frac{dT_1}{d\varepsilon_0}\right] = \lambda \cdot \frac{dT_1}{d\varepsilon_0}. \tag{3.6}$$

When $\lambda < 1$, households are partially inattentive to T_1. The limiting case of $\lambda = 1$ corresponds to FIRE. Substituting equation (3.6) into (3.5) we obtain the following result.

Proposition 1. *The propensity to spend out of an aggregate transfer is given by:*

$$\frac{dC_0}{d\varepsilon_0} = m_0 - m_1\lambda \cdot \frac{dT_1}{d\varepsilon_0} = (1 - \lambda)\, m_0. \tag{3.7}$$

It follows that Ricardian equivalence fails when households are inattentive, i.e., $\lambda < 1$.

According to Proposition 1, inattention reduces the intertemporal MPC from m_1 to $m_1\lambda$. For $\lambda < 1$, future tax liabilities are less important for current spending decisions than under FIRE, an effect that amplifies the response of aggregate demand to transfers. Since agents believe that a transfer raises their permanent income, they increase current consumption, and Ricardian Equivalence fails to hold.

Appendix C.6 shows that various micro-founded models give rise to the representation of expectations given by 3.6. These models incorporate dispersed information and rational expectations (Lucas Jr, 1972; Woodford, 2003a), rational inattention (Sims, 2003), sticky information (Mankiw and Reis, 2002; Carroll et al., 2020; Auclert et al., 2020), cognitive discounting (Gabaix, 2020), behavioral inattention or sparsity (Gabaix, 2014, 2019), different forms of general-equilibrium inattention and level-k thinking (Bianchi-Vimercati et al., 2024; Mei and Wu, 2024), policy function/cognitive uncertainty (Ilut and Valchev, 2023; Enke and Graeber, 2023), and limited planning horizons (Woodford, 2019; Woodford and Xie, 2019, 2022). The equivalence among these models arises from a shared feature: the response to changes in the economic environment is attenuated relative to the FIRE benchmark.

Discussion The discussion above shows that inattention dampens forward-looking intertemporal MPCs and amplifies the spending response to transfers. Models that incorporate structural features such as finite lives and incomplete markets also weaken forward-looking MPCs. However, they do so in a way that also affects the contemporaneous MPC (m_0).[11] In contrast, inattention dampens forward-looking intertemporal MPCs without changing the contemporaneous MPC. It is precisely this property that allows the inattentive HANK model to account for our survey-based finding that the planned propensity to spend out of transfers equals the MPC.

3.2 Estimating the Planned Propensity to Spend out of Transfers

This section presents the results of our survey regarding people's planned spending in the three experiments discussed above.[12] In *Experiment 1* (E1), respondents are told that their household receives 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 Experiment 1 is to estimate the MPC out of a typical cash transfer that does not have broader fiscal implications. Formally, we use Experiment 1 to estimate the marginal propensity to consume, m_0. The wording of Experiment 1 is given by:

> **Experiment 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.*

[11]For example, Angeletos et al. (2024a,b) develop a tractable overlapping generations model with finite lives that breaks Ricardian Equivalence to evaluate the consequences of fiscal policy on spending behavior (see also Blanchard, 1985; Farhi and Werning, 2019). In this setting, the contemporaneous MPC is given by $m_0 = (1 - \omega\beta)$,where ω is the survival probability and β is the discount factor. The forward-looking MPCs are given by $m_t = (1 - \omega\beta)(\omega\beta)^t$, implying a tight structure linking the response of spending to current taxes responses. These functional relationships illustrate that any attenuation of forward-looking MPCs necessarily induces a corresponding change in the contemporaneous MPC, a constraint that is absent in models of inattention. This insight generalizes beyond finite-lives models; see Farhi, Olivi, and Werning (2022).

[12]In Appendix Table B.2, we show the distribution of characteristics for the sub-samples of the people who participated in each of the three experiments. There are no meaningful differences across the three groups of people.

In *Experiment 2* (E2), 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. Experiment 2 allows us to estimate people's planned spending response to an aggregate transfer policy. The wording of experiment E2 is given by:

> **Experiment 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.*

Experiment 3 (E3) closely mirrors E2 with one important difference: respondents are informed that the government will raise their personal taxes in the following year to offset the current fiscal deficit. This scenario is useful to include in our analysis for two reasons. First, it is possible that, when responding to E2, a household thinks that other people, not them, will pay for the increase in transfers. Scenario E3 provides a check on this possibility. Second, providing households with information about how their personal taxes will change in the future reduces the cognitive burden associated with forecasting the fiscal consequences of government transfers. The wording of Experiment 3 is given by:

> **Experiment 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.*

Following the methodology developed by Colarieti et al. (2024), our survey design has three important components. First, we provide clear definitions of spending, debt payments, and savings to ensure a consistent understanding among respondents. Second, we explicitly state that the reported spending from a transfer should be in addition to pre-transfer planned expenditures. Finally, we employ the interactive matrix design of Colarieti et al. (2024) to reduce the computational complexity that respondents face when allocating their cash transfers across different uses and times.

Figure 3.1 depicts the matrix interface used in the survey. We ask respondents to report their additional spending and debt payment plans for each of the following 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

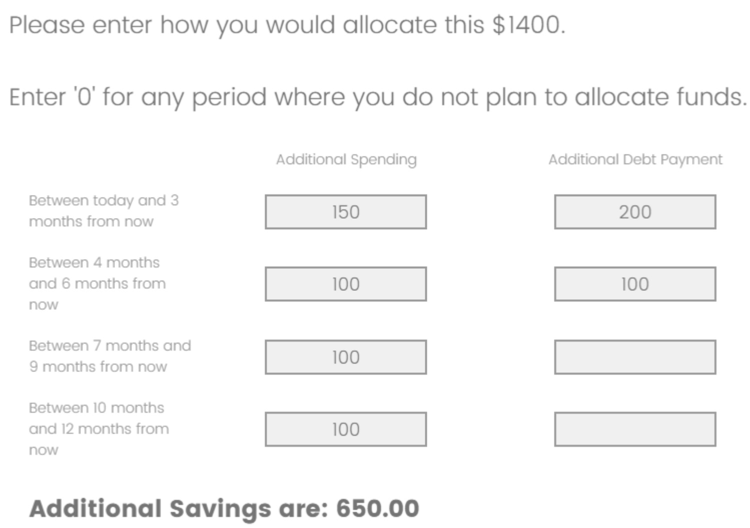

Figure 3.1: Interactive Matrix Design

Notes: This figure illustrates the interactive matrix design implemented in the survey. Participants can specify amounts for additional spending and additional debt payments in each of the four periods. Any unallocated portion of the transfer is automatically categorized as additional savings, which is displayed dynamically as respondents input their allocations.

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 an 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. This design allows respondents to spend more than the transfer they receive.

We aggregate the additional spending plan at an annual frequency and define the MPC for individual i as:

$$\Delta\text{SpendPlan}_i \equiv \frac{\sum_{t=0}^{3} \frac{1}{(1+r)^t}\text{Additional Spending}_{i,t}}{\$1,400}. \tag{3.8}$$

We set the interest rate, r, to 0.5%,implying an annual interest rate of 2 percent.[13]

Figure 3.2 displays the average propensity to spend, over all respondents, in E1 (red),

[13] In Appendix Figure A.5, we report the quarterly intertemporal MPCs associated with experiment E1,

$$\Delta\text{SpendPlan}^q_{i,t} \equiv \frac{\text{Additional Spending}_{i,t}}{\$1,400}.$$

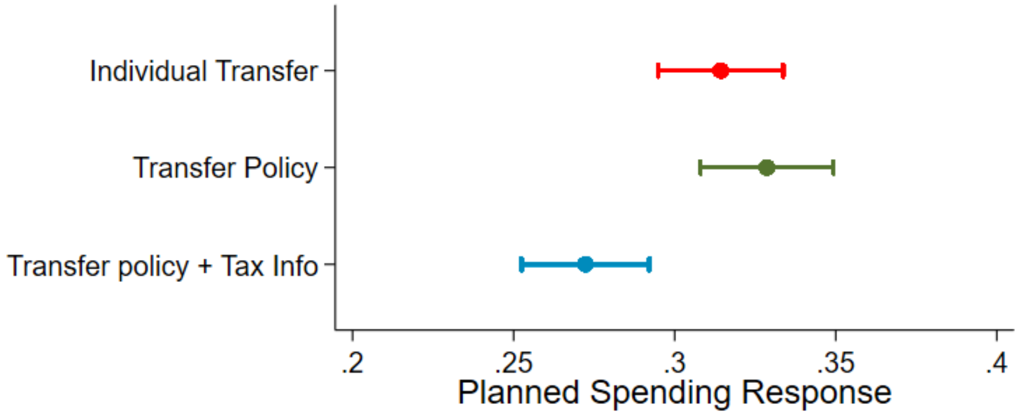

Figure 3.2: Annual Planned Propensity to Spend Across Experiments

Notes: The figure reports the average planned propensity to spend across experiments E1, E2 and E3. The planned propensity to spend is computed as total planned spending divided by the $1,400 transfer amount and aggregated to an annual rate. Each dot represents the average planned spending response in a given experiment, with horizontal lines indicating 99% confidence intervals., computed by bootstrap. "Individual Transfer" refers to the individual tax rebate of Experiment 1; "Transfer Policy" presents the universal transfer framed as government policy in Experiment 2; "Transfer Policy + Tax Info" adds information about the potential future tax implications of the policy of Experiment 3. Values above the 99th percentile are set equal to the 99th-percentile value for each expirement.

E2 (green), and E3 (blue). The bars represent 99% bootstrapped confidence intervals for these statistics.[14]

In E1, people spend $440 out of an individual rebate of $1,400, implying an average MPC of 0.314. This value is consistent with estimates in the literature, see Appendix C.4.

The average planned propensity to spend in experiment E2 is 0.329. The overlapping confidence intervals in the previous figure suggest that the difference in average planned spending between experiments E1 and E2 is statistically insignificant. Table 1 presents a formal test of the difference between the averages based on bootstrapping the difference statistic. Based on this test, we cannot reject the hypothesis that the difference equals zero. In our quantitative work, we assume that the annual MPC equals 0.32, the average of the corresponding numbers in experiments E1 and E2. Figure A.4 in the Appendix shows that the similarity in spending plans under E1 and E2 holds for the entire distribution of MPCs, reinforcing the view that future taxation exerts only a modest dampening effect on households' consumption plans.

[14] Appendix Figure A.4 reports the distribution of spending plans in the different scenarios. Panel A compares the distributions of MPCs under E1 and E2, represented in blue and red, respectively. Panel B illustrates the distributions of MPCs under E1 and E3, again using blue and red to differentiate between the two groups.

	Estimate	Difference vs. E1	p-value
E1	0.314	–	–
E2	0.328	0.014	0.18
E3	0.272	-0.042***	0.00

Table 1: Estimates of Annual Planned Propensity to Spend Across Experiments

Notes: This table reports the average planned propensities to spend for experiments E1, E2, and E3, as well as bootstrap tests of the difference in means relative to E1. To compare the mean MPCs between experiments E1 and E2 or E3, we construct a bootstrap confidence interval for the difference in means. In each bootstrap replication, we draw a random sample with replacement from the original data, compute the mean MPC in each experiment, and then calculate their differences. Repeating this procedure yields a bootstrap distribution for the difference in means, from which we obtain a 99% confidence interval. P-values are computed based on 1,000 bootstrap replications. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

Recall that in E3, we provide respondents with explicit information about the specific path of their own future taxes. Panel B of 3.2 indicates that this information leads to a statistically significant reduction in the average propensity to spend, from 0.314 to 0.272. Figure A.4, shows that the proportion of individuals who would save all of the transfer increases. These findings suggest that individuals become more responsive to anticipated future taxes when they are explicitly told that their personal tax burden will rise. But even with this additional information, Ricardian Equivalence does not hold.

4 HANK Under FIRE

In this section, we explore the quantitative consequences of transfer policies for spending behavior through the lens of a canonical HANK model under FIRE (Auclert et al., 2024b). We begin with a concise overview of the model's key structural components. Appendix D presents further technical details.

Time is discrete and infinite $t = 0, 1, ...$ Each period corresponds to a quarter. At time 0, the economy is perturbed by a set of fiscal policy shocks, described below. The time path for these aggregate disturbances is determined at time 0, so there is no aggregate uncertainty. Households face uncertainty due to uninsurable idiosyncratic-income risk.

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

$$\mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t u\left(c_{i,t}, n_{i,t}\right) \right], \tag{4.1}$$

where $u\left(c,n\right) = \frac{c^{1-\sigma^{-1}}}{1-\sigma^{-1}} - \chi \frac{n^{1+\psi^{-1}}}{1+\psi^{-1}}$, $\beta \in (0,1)$ denotes the discount factor, and $\mathbb{E}_0\left[\cdot\right]$ denotes the full-information rational-expectations operator.

At each date t, household i's idiosyncratic productivity state is given by $e_{i,t}$. The idiosyncratic productivity shock, which is independent across people, follows an AR(1) in logs 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

$$c_{i,t} + a_{i,t+1} = \left(1-\tau_t\right)\left(e_{i,t}\frac{W_t}{P_t}n_{i,t}\right)^{1-\gamma} + \left(1+r_t\right)a_{i,t} - T_t, \tag{4.2}$$

where $w_t \equiv \frac{W_t}{P_t}$ denotes the real wage rate, and T_t denote lump-sum taxes. Given pre-tax income, $y_{i,t} = e_{i,t}\frac{W_t}{P_t}n_{i,t}$, people's after-tax income is given by the retention function $\left(1-\tau_t\right)y_{i,t}^{1-\gamma}$, where τ_t controls the average level of taxation and γ captures the progressivity of the income-tax code (see Heathcote et al., 2017). All households are subject to the borrowing constraint:

$$a_{i,t+1} \geq 0. \tag{4.3}$$

Firms A continuum of identical firms operate 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, $P_t = W_t$. 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 (e.g., Erceg, Henderson, and Levin, 2000, Schmitt-Grohé and Uribe, 2005, and Auclert et al., 2024b). As in Auclert et al. (2024b), we assume an equal rationing rule so $n_{i,t} = N_t$ for all i. Appendix D shows that the NK Phillips curve is given by:

$$\pi_t^w = \kappa_w \left[\psi^{-1} \cdot \frac{dN_t}{N} + \sigma^{-1}\frac{dC_t}{C} - \left\{ \frac{dZ_t}{Z} - \frac{dN_t}{N} \right\} \right] + \beta \mathbb{E}_t\left[\pi_{t+1}^w\right]. \tag{4.4}$$

Here κ_w is a scalar that depends on the cost of adjusting wages and $Z_t \equiv Y_t - \mathcal{T}_t^Y$ denotes after-tax labor income, where $\mathcal{T}_t^Y$ denotes total income tax revenue. The notation dX_t denotes the deviation of a variable X_t from its steady-state value.

Fiscal and Monetary Policies The government spends G and issues real debt, B_t. The government's budget constraint, defined in terms of real variables, is given by

$$G + (1 + r_t) B_t = \mathcal{T}_t^Y + T_t + B_{t+1}. \tag{4.5}$$

The process for government debt follows:

$$B_{t+1} = (1 - \rho_b) B + \rho_b B_t + \varepsilon_t, \tag{4.6}$$

where ε_t denotes the transfer, $\rho_b \in (0, 1)$ determines the persistence of government debt, and B denotes the steady-state level of government debt. We assume that the initial transfer is disbursed as a lump-sum payment $dT_0 = -\varepsilon_0$. The government finances this deficit with future taxes. We consider two alternative forms of financing. First, we assume that the government keeps income taxes constant $\mathcal{T}_t^Y = \mathcal{T}^Y$, and finances the deficit with future lump-sum taxation, T_t. Second, we consider the case in which $T_t = 0$, and the government finances deficits with future distortionary taxation, $\mathcal{T}_t^Y$.

Monetary policy is given by a Taylor rule:

$$(1 + i_t) = (1 + r^*) e^{\phi_\pi \pi_t}, \tag{4.7}$$

where i_t denotes the nominal interest rate, π_t is inflation, r^* is a scalar, and $\phi_\pi > 1$ is the Taylor coefficient on inflation. For simplicity, we do not include an output gap term in the Taylor rule.

Aggregation and Equilibrium The market clearing conditions for goods and asset markets are given by

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

respectively.

Aggregate consumption and asset demand are given by

$$C_t \equiv \int_0^1 c_{i,t} di, \quad \text{and} \quad A_t \equiv \int_0^1 a_{i,t} di.$$

We adopt the sequence-space representation of aggregate consumption, developed in Auclert et al. (2024b), which expresses aggregate demand as a functional of the underlying inputs to the household sector:

$$C_t = \mathcal{C}_t\left(\left\{T_s, Y_s - \mathcal{T}_s^Y, r_s\right\}_{s=0}^{\infty}\right). \tag{4.8}$$

Here $Y_s - \mathcal{T}_s^Y$ denotes aggregate after-tax real labor income.

4.1 The Propensity to Spend out of Transfers

We now use our model to analyze the implications of transfer policies for aggregate spending. Our approach begins by mapping the experiments into properties of the aggregate spending function $\mathcal{C}_t(\cdot)$. To evaluate the year-one response of aggregate consumption, we define the present value of consumption over the first year as follows:

$$C_0^{\text{annual}} = \sum_{s=0}^{3} \frac{1}{(1+r)^s} C_s, \tag{4.9}$$

where r denotes the steady-state real interest rate.

In survey experiment E1, respondents report their planned change in spending following the receipt of an idiosyncratic transfer at date $t = 0$. Since this transfer is idiosyncratic, it does not affect aggregate taxes, employment, income, or interest rates. Accordingly, the average marginal propensity to consume out of the transfer is given by:

$$m_0 \equiv \frac{\partial C_0^{\text{annual}}}{-\partial T_0} = \sum_{s=0}^{3} \frac{1}{(1+r)^s} \frac{\partial \mathcal{C}_s\left(\left\{T, Y - \mathcal{T}^Y, r\right\}_{s=0}^{\infty}\right)}{-\partial T_0}. \tag{4.10}$$

The aggregate transfer in experiment E2 induces GE effects. Under FIRE, households internalize the future adjustments in taxes, employment, and interest rates into their decision rule. The derivative of annualized consumption with respect to the size of the transfer shock, ε_0, is given by:

$$\frac{dC_0^{\text{annual}}}{d\varepsilon_0} = \underbrace{m_0}_{\text{MPC}} - \overbrace{\left\{\sum_{t=1}^{\infty} m_t \cdot \frac{dT_t}{d\varepsilon_0} + \sum_{t=0}^{\infty} M_t^Y \cdot \frac{d\mathcal{T}_t^Y}{d\varepsilon_0}\right\}}^{\text{Anticipation of Future Taxes}} + \underbrace{\sum_{t=0}^{\infty} M_t^Y \cdot \frac{dY_t}{d\varepsilon_0} + \sum_{t=0}^{\infty} M_t^r \cdot \frac{dr_t}{d\varepsilon_0}}_{\text{Anticipation of G.E. Effects}}, \tag{4.11}$$

where $m_t = -\partial C_0^{\text{annual}} / \partial T_t$ and $M_t^x = \partial C_0^{\text{annual}} / \partial x_t$ for $x \in \{Y, r\}$.

This decomposition highlights three channels through which the aggregate propensity to spend out of transfers differs from the MPC, m_0. First, financing the transfers necessitates future *fiscal adjustments*–either through lump-sum taxes $\{T_t\}$ or distortionary income taxes $\{\mathcal{T}_t^Y\}$– which reduce consumption via the terms $\sum_{t=1}^{\infty} m_t \cdot dT_t$ or $\sum_{t=0}^{\infty} M_t^Y \cdot d\mathcal{T}_t^Y$, respectively. Second, transfers increase aggregate labor demand, raising *employment and income*. The resulting increase in consumption is captured by the term $\sum_{t=0}^{\infty} M_t^Y dY_t$. Finally, higher aggregate demand generates a higher inflation rate, prompting the central bank to raise nominal and *real interest rates*. The resulting contractionary effect on consumption is captured by the term $\sum_{t=0}^{\infty} M_t^r \cdot dr_t$.

We now use a calibrated version of this model to understand why and by how much the propensity to spend out of economy-wide transfers deviates from the marginal propensity to consume m_0 in the quantitative HANK model.

Calibration We calibrate the model to a quarterly frequency and a steady state with zero inflation. Table 2 reports the values of the calibrated parameters. We set the intertemporal elasticity of substitution to a standard value, $\sigma = 0.5$, and the Frisch elasticity to $\psi = 0.75$, following Chetty, Guren, Manoli, and Weber (2011).

We normalize the steady state so that output $Y = N = 1$. This normalization implies that the parameter governing the disutility of labor, χ, equals 0.64. Productivity shocks are drawn from a discretized AR(1) process in logs with persistence parameter $\rho_e = 0.95$ and standard deviation $\sigma_e = 0.75$. As in Auclert et al. (2024b), we set the steady state value of G/Y to 0.20. Steady-state lump-sum taxes are set to $T = 0$, implying that the marginal tax rate that finances steady state spending and interest on debt equals $\tau = 0.19$.

Finally, we calibrate the discount factor β and the steady-state value of B/Y, 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 out of the transfer reported in survey experiment E1.This procedure yields $\beta = 0.96$ and $B = 3.92$.[15]

We assume the Taylor coefficient, ϕ_π, is equal to 1.5, 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. (2024b), we set the annual persistence of debt to 0.93, which implies that the quarterly persistence parameter, ρ_b, equals 0.98.

[15] Echoing results in Auclert et al. (2024b), Figure A.5 in the Appendix shows that the HANK model also provides a good match to the quarterly intertemporal MPCs out of an idiosyncratic transfer, $m_t^q \equiv \partial C_t / \partial \varepsilon_0$, observed in our survey data. That is, the model matches the fraction of the transfer that individuals consume in each quarter over the first year.

Parameter	Description	Value	Parameter	Description	Value
σ	IES	0.5	ψ	Frisch	0.75
β	Discount factor	0.96	κ_w	Wage Rigidity	0.0062
r	Real interest rate	0.5%	ρ_b	Persistence of debt	0.98
ρ_e	Persistence e	0.95	G	Spending	0.20
σ_e	Variance e	0.75	B	Assets	3.92
χ	Labor disutility	0.64	ϕ_π	Taylor coefficient	1.5

Table 2: Calibrated Parameters

Notes: This table reports the parameter values used in the baseline calibrated HANK model. See text for details on the calibration.

Replicating Experiment E2 in the Model Figure 4.1 displays the planned propensity to spend out of transfers under the assumption that government deficits are financed through future lump-sum taxation. The first bar (blue) represents the planned spending response to an aggregate transfer. Under FIRE, the propensity to spend out of transfers, 0.23, is substantially smaller than the MPC, m_0, 0.32. This discrepancy implies that the HANK model fails to account for the central empirical finding that individuals' planned spending out of transfers equals their MPC.

The remaining bars in the figure decompose the aggregate spending response according to equation (4.11). The second bar (green) shows the MPC out of an individual transfer, m_0, which by construction equals 0.32. The third bar (red) shows the contractionary effect of anticipated future taxes. The fourth bar (orange) reflects the expansionary general equilibrium effect of higher aggregate income. The final bar (gray) represents the contractionary effect of the higher real interest rates induced by the central bank's response to inflation.

The decomposition shows that under FIRE, households internalize future fiscal adjustments associated with aggregate transfers. The anticipation of future taxation exerts substantial downward pressure on spending, even though households face incomplete markets and borrowing constraints, and government debt is highly persistent. The income and interest rate channels partially offset each other. As a result, their combined effect is small and insufficient to align the response of planned spending to a transfer to the MPC.

Figure 4.2 displays the planned propensity to spend out of transfers under FIRE when the government finances deficits through future labor income taxation. The overall response, shown in the first bar (blue), is 0.24, which is still well below the MPC, 0.32. The

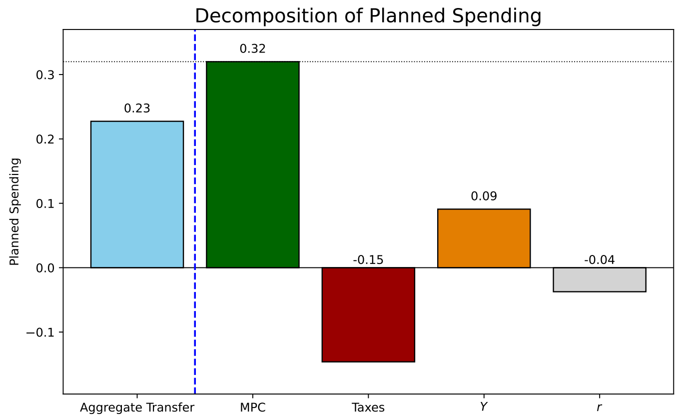

Figure 4.1: HANK under FIRE: Planned Propensity to Spend out of Aggregate Transfers under FIRE with Lump-Sum Taxes

Notes: This figure presents the decomposition of the planned propensity to spend out of an aggregate transfer under FIRE. The bars correspond to the respective components of the analytical expression for $\frac{\partial C_0^{\text{annual}}}{\partial \varepsilon_0}$ derived in equation (4.11). The green bar denotes the direct marginal propensity to consume out of an individual transfer (m_0). The red bar denotes the dampening effect of future lump-sum taxes ($\sum_t m_t \cdot \frac{dT_t}{d\varepsilon_0} + \sum_t M_t^Y \cdot \frac{d\mathcal{T}_t^Y}{d\varepsilon_0}$), while the orange bar corresponds to the positive general equilibrium response of income ($\sum_t M_t^Y \cdot dY_t$). The gray bar denotes the effect of changes in real interest rates through the monetary policy response ($\sum_t M_t^r \cdot dr_t$). The sum of all components is equal to the the aggregate spending response to the transfer in blue.

remaining bars correspond to the same decomposition components as in Figure 4.1, now evaluated when deficits are paid for with labor income taxation. Compared to the lump-sum case, the tax effect is slightly smaller. This decline is due to the more progressive nature of labor income taxation. The income and interest rate effects are slightly larger, reflecting the interaction of tax rates, wages, and inflation. As in the lump-sum tax case, on net, the GE effects are modest and insufficient to reconcile the model with the empirical evidence.

In sum, our analysis of the HANK model under FIRE indicates that, under a standard calibration, the model fails to replicate our central empirical finding: individuals' planned spending out of transfers is very similar to their MPC. While it is mechanically feasible to calibrate the model to generate a planned spending response to a transfer of 0.32, doing so requires elevating the MPC beyond levels consistent with microeconomic evidence. Put differently, the model can be rendered consistent with the micro-estimate of the MPC or the planned propensity to spend out of an aggregate transfer, but not both.

In Appendix D.4, we consider three alternative specifications for policy. First, we examine a scenario in which transfers are financed by an exogenous windfall, which eliminates the need for deficit financing via higher taxes. In our model, this case is formally

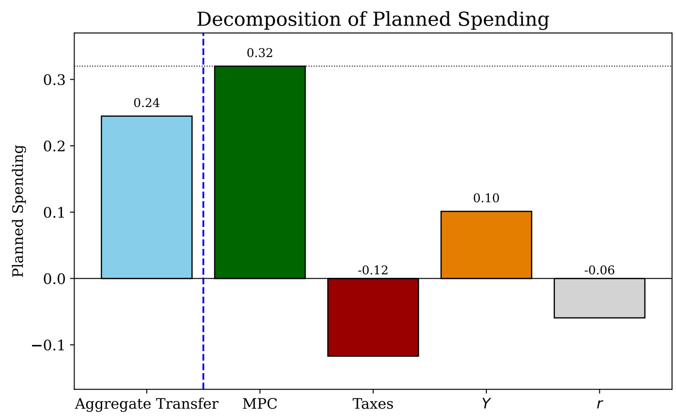

Figure 4.2: HANK under FIRE: Planned Propensity to Spend out of Aggregate Transfers under FIRE with Labor-Income Taxation

Notes: This figure presents the decomposition of the planned propensity to spend out of an aggregate transfer under full information rational expectations (FIRE). The bars correspond to the respective components of the analytical expression for $\frac{\partial C_0^{\text{annual}}}{\partial \varepsilon_0}$ derived in equation (4.11). The green bar depicts the direct marginal propensity to consume out of an individual transfer (m_0). The red bar reflects the dampening effect of future labor-income taxes ($-\sum_t M_t^Y \cdot \frac{d\mathcal{T}_t^Y}{d\varepsilon_0}$), while the orange bar corresponds to the positive general equilibrium response of income ($\sum_t M_t^Y \cdot dY_t$). The gray bar denotes the effect of changes in real interest rates through the monetary policy response ($\sum_t M_t^r \cdot dr_t$). The sum of all components yields the aggregate spending response to the transfer in blue.

equivalent to funding the transfer via a reduction in government spending, G_0. This case also approximates a scenario in which only very-high-income households with low MPCs are taxed. Second, we study a specification in which monetary policy maintains a constant real interest rate, consistent with a common assumption in the HANK literature. Finally, we analyze a scenario in which the government keeps the level of debt elevated for t_{delay} periods before gradually increasing taxes to finance the initial deficit. We analyze the effects of delaying taxes for up to 10 years. None of these alternatives reconciles the model's implications with our survey-based evidence. Finally, Appendix E.3 shows that the empirical results for experiment E3 are as challenging to the canonical HANK model as the results for experiment E2.

5 Inattentive HANK model

In this section, we extend the model to incorporate household inattention. Inattention gives rise to two opposing forces. On the one hand, inattentiveness to future taxation leads households to increase their spending out of transfers relative to the FIRE benchmark. On the other hand, inattentiveness to the GE effects of policy on changes in employment, income, and interest rates attenuates the spending response. We show that for moderate levels of inattention, the former effect dominates.

Household Behavior under Inattention In this section, we adopt a simple and tractable formulation of inattention. Our modeling framework is based on the cognitive discounting model of Gabaix (2020).[16] We assume that households possess full information about current macroeconomic conditions but systematically under-forecast the evolution of the aggregate state variables by a factor $\lambda \in [0, 1]$. As in Gabaix (2020), this implies that household expectations for each variable $X \in \{T, \mathcal{T}^Y, Y, r\}$ are given by:

$$E_t [dX_{t+h}] = \lambda^h \cdot \mathbb{E}_t [dX_{t+h}], \tag{5.1}$$

where $\mathbb{E}_t [dX_{t+h}]$ reflects the model consistent expectation of dX_{t+h}.[17] To isolate the implications of distorted expectations about aggregate variables, we maintain the assumption that households have rational expectations with respect to idiosyncratic shocks. A value of $\lambda = 1$ corresponds to FIRE.

To solve the model numerically, we employ the sequence-space Jacobian method of Auclert et al. (2020). Let $\mathcal{J}^X = [\mathcal{J}^X_{t,s}]_{t,s=0,1,\ldots}$ denote the Jacobian matrix of aggregate consumption with respect to variable X evaluated at the steady-state under FIRE,

$$\mathcal{J}^X_{t,s} = \frac{\partial \mathcal{C}_t \left(\{T, \mathcal{T}^Y, Y, r\} \right)}{\partial X_s}, \quad t, s = 0, 1, \ldots$$

Following the representation in Bardóczy and Guerreiro (2023), the aggregate consumption response in the model with inattention is given by

$$d\boldsymbol{C} = \sum_{X \in \{T, \mathcal{T}^Y, Y, r\}} \left\{ \mathcal{J}^X \cdot E_0 [d\boldsymbol{X}] + \sum_{h=1}^{\infty} \mathcal{R}^X_h \cdot FR_h [d\boldsymbol{X}] \right\}.$$

Here $d\boldsymbol{X} = [dX_t]_{t=0,1,\ldots}$ is the time path of shocks to variable X, $FR_h [d\boldsymbol{X}] \equiv E_h [d\boldsymbol{X}] - E_{h-1} [d\boldsymbol{X}]$ denotes the forecast revision at time h, and $\mathcal{R}^X_h$ is the forecast-revision Jacobian

[16] In Section 3.1, we argue that different modeling alternatives deliver qualitatively similar conclusions. In this section, we adopt the cognitive discounting model for its simplicity and transparency.

[17] In this section, we use dX_{t+h} as short-hand for $dX_{t+h}/d\varepsilon_0$.

defined by

$$\mathcal{R}_h^X = \begin{bmatrix} \mathbf{0}_{h\times h} & \mathbf{0}_{h\times\infty} \\ \mathbf{0}_{\infty\times h} & \mathcal{J}^X \end{bmatrix}.$$

This representation can be interpreted as follows. At time $t = 0$, households behave as if their expectations are correct so their initial response coincides with the FIRE benchmark, $\mathcal{J}^X$. As time progresses, households recognize that their earlier expectations were incorrect and revise them accordingly. These forecast revisions are treated by households as new information and elicit the same response as would a new shock. That response is captured by a time-shifted version of the Jacobian. From the perspective of the econometrician/modeler, these revisions are predictable, and their accumulation alters the equilibrium dynamics in a manner that systematically deviates from the FIRE benchmark (see Angeletos et al., 2025, for a discussion).

In the inattentive HANK model, people's expectations are given by $E_t[d\boldsymbol{X}] = \Lambda_t \cdot d\boldsymbol{X}$ where Λ_t is a diagonal matrix with entries $\Lambda_{t,(s,s)} = 1$ if $s \leq t$ and $\Lambda_{t,(s,s)} = \lambda^{s-t}$ for $s > t$. So, we can write

$$d\boldsymbol{C} = \sum_{X\in\{T,\mathcal{T}^Y,Y,r\}} \widetilde{\mathcal{J}}^X \cdot d\boldsymbol{X},$$

where $\widetilde{\mathcal{J}}^X = \mathcal{J}^X \cdot \Lambda_0 + \sum_{h=1}^{\infty} \mathcal{R}_h^X \cdot (\Lambda_h - \Lambda_{h-1})$ denotes the generalized Jacobians.

The Propensity to Spend out of Transfers We now show that the inattentive HANK model can account for our central empirical finding: individuals' planned propensity to spend out of transfers coincides with their marginal propensity to consume.

Establishing this connection requires careful treatment of timing, given how survey responses are elicited. Throughout, we have interpreted our empirical estimates as measuring planned spending responses. Under FIRE, this distinction is immaterial, as planned and realized behavior coincide. However, when deviating from FIRE, households revise their expectations in real time as new information arrives and past forecast errors are revealed. As a result, realized consumption behavior may diverge from the initial plans made under incorrect forecasts of current and future aggregate macroeconomic variables.

Let $E_{-1}\left[dC_0^{\text{annual}}/d\varepsilon_0\right]$ denote the individual's planned propensity to spend out of a transfer at the time of the survey response. Proposition 2 characterizes how cognitive discounting influences the planned spending. Two implications are worth emphasizing. First, Proposition 2 shows that the response to purely idiosyncratic transfers is identical to the response under FIRE. Second, inattention attenuates the forward-looking components of the consumption response associated with anticipated changes in taxes, income, and interest rates.

Proposition 2. *Suppose that households form expectations according to the cognitive discounting model with discount factor $\lambda \in [0,1]$. Then, their planned spending response to an aggregate transfer, prior to observing any realized general equilibrium effects of the policy, is given by:*

$$E_{-1}\left[\frac{dC_0^{annual}}{d\varepsilon_0}\right] = m_0 - \sum_{t=1}^{\infty} m_t \lambda^{t+1} \cdot \frac{dT_t}{d\varepsilon_0} - \sum_{t=1}^{\infty} M_t^Y \lambda^{t+1} \cdot \frac{d\mathcal{T}_t^Y}{d\varepsilon_0} + \sum_{t=0}^{\infty} M_t^Y \lambda^{t+1} \cdot \frac{dY_t}{d\varepsilon_0} + \sum_{t=0}^{\infty} M_t^r \lambda^{t+1} \cdot \frac{dr_t}{d\varepsilon_0}. \tag{5.2}$$

Figure 5.1 plots the planned spending response to an aggregate transfer as a function of the cognitive discounting parameter. In this experiment, we assume that future taxation takes the form of lump-sum taxes.[18] When $\lambda = 1$, the planned spending response coincides with the FIRE benchmark.

As λ decreases from 1, the planned response initially increases, reflecting the RNE effect, i.e., inattention to future taxes. This pattern arises because government debt is highly persistent in the baseline calibration, i.e., fiscal adjustments occur only in the distant future. By "distant future" we mean large values of t where cognitive discounting has strong effects. In contrast, the general-equilibrium effects of the policy, such as changes in income and interest rates, materialize in the near term (low values of t) and are subject to less discounting. For values of λ closer to zero, the RNE effect becomes weaker, the GE dampening effect dominates and the planned spending response begins to decline.

Figure 5.1 shows that, for a moderate degree of inattention, the inattentive HANK model can account for the finding that the planned propensity to spend out of transfers is equal to the MPC.

Model Calibration With one exception, all of the parameters in the inattentive HANK model are equal to their values in the HANK model under FIRE. We calibrate the additional parameter, λ, governing inattention to match our empirical estimate of the planned propensity to spend out of a government transfer (0.32). This choice yields $\lambda = 0.89$, implying that one-year-ahead expectations are discounted by approximately 35% relative to the FIRE benchmark. This level of inattention is broadly consistent with estimates from the literature on information rigidities (e.g., Coibion and Gorodnichenko, 2012, 2015). Because experiment E1 does not involve future tax liabilities or other GE effects, the inattentive HANK model makes the same prediction as the model under FIRE.

[18] Alternative, we could have considered calibrating λ assuming that future taxes take the form of distortionary taxation. In Appendix E.2, we show that this alternative calibrated λ to essentially the same level.

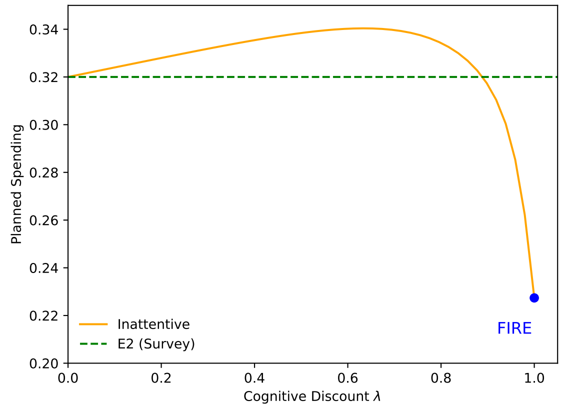

Figure 5.1: Inattentive HANK: Planned Propensity to Spend out of Aggregate Transfers as a Function of Inattention

Notes: The figure shows the relationship between the cognitive discount λ and the planned propensity to spend out of a transfer. The dashed green line denotes the empirical target from the survey (0.32). The solid orange line displays model-implied spending for different values of λ.

The model's ability to account for the fact that the planned propensity to spend equals the marginal propensity to consume is mainly driven by a significant dampening of the response to future taxes. See Figure 5.2 for the decomposition of planned spending when lump-sum taxes finance deficits.[19]

Appendix E.2 shows that the calibrated value of λ for the case of distortionary taxation is equal to 0.9. Appendix E.3 reports the results of calibrating λ to match the evidence from experiment E3. The implied value of λ is 0.91. The qualitative results are robust to these alternative calibrations of λ.

6 Can RANK or TANK Models Account for the Survey Evidence?

In this section, we show that RANK and TANK models cannot account for our survey-based findings. These shortcomings motivate why we analyze the aggregate effects of transfers using the HANK model. We first discuss our main findings regarding the RANK models, with and without inattention. We then discuss our findings regarding the TANK model. All details are relegated to Appendix Section F.

[19] Appendix Figure A.6 replicates these findings for the case of distortionary labor-income taxes.

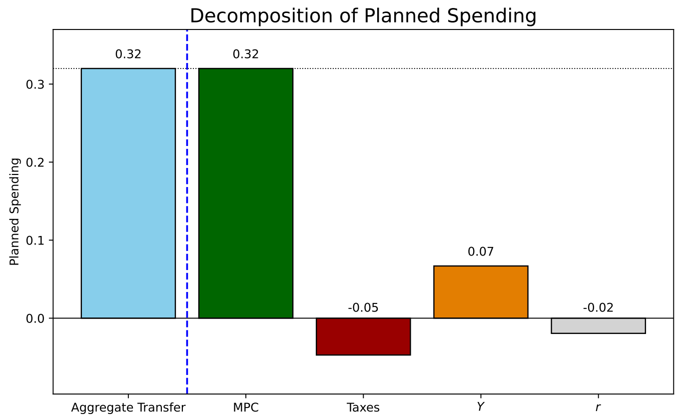

Figure 5.2: Inattentive HANK: Planned Propensity to Spend out of Aggregate Transfers with Lump-Sum Taxes

Notes: This figure presents the decomposition of the marginal propensity to spend out of an aggregate transfer in the inattentive HANK model. The bars correspond to the respective components of the analytical expression for $\frac{\partial C_0^{\text{annual}}}{\partial \varepsilon_0}$ derived in equation (5.2). The green bar denotes the marginal propensity to consume out of an individual transfer (m_0). The red bar reflects the dampening effect of future lump-sum taxes ($\sum_t m_t \cdot \frac{dT_t}{d\varepsilon_0}$), while the orange bar corresponds to the response of spending to an increase in aggregate income, ($\sum_t M_t^Y \cdot dY_t$). The gray bar denotes the impact of monetary policy on real interest rates, ($\sum_t M_t^r \cdot dr_t$).

6.1 The RANK Model

We consider a RANK economy with cognitive discounting as in Gabaix (2020). Standard calibrations of the RANK model set β to match the steady-state real interest rate. In our calibration, we target an annual real interest rate of 2%.

Consider experiment E1 in our calibrated RANK model. The implied MPC out of income is $m_0 = 1 - \beta^4 \approx 0.02$. This finding reproduces the well-known fact that the RANK model implies very low MPCs. So that model cannot match our findings for experiment E1.

Next, we consider experiment E2. Under FIRE ($\lambda = 1$), the average propensity to spend out of an aggregate transfer/tax is zero, i.e., Ricardian Equivalence holds. With inattention ($\lambda < 1$), the equilibrium level of consumption depends on the level of debt because households under-forecast future taxes.

Appendix F shows that the average planned spending out of a transfer is below 0.02 for all values of λ. This result reflects the fact that planned spending is tightly pinned down by the MPC.

These results highlight the complementarity between the MPC and the magnitude of the RNE effect on people's spending. Inattention breaks Ricardian Equivalence in the

RANK and HANK models. In the inattentive RANK model, agents feel wealthier after a transfer, but the low value of their MPC implies that they increase spending by a small amount. The larger value of the average MPC in the inattentive HANK model generates a larger response in spending plans. In Appendix G, we analyze a tractable HANK framework that allows us to analytically formalize the complementarity between high MPCs and the degree of RNE.

We conclude that a RANK model with inattention cannot account for our survey-based findings regarding experiment E2 or to generate quantitatively significant deviations from Ricardian Equivalence.

6.2 The TANK model

In standard TANK models, a constant fraction μ of consumers are hand-to-mouth and a fraction $1-\mu$ of consumers are not liquidity constrained (e.g., Campbell and Mankiw, 1989, and Bilbiie, 2008). We refer to the latter consumers as Permanent-Income-Hypothesis (PIH) consumers.

In Appendix Section F, we show that, in the TANK model under FIRE, the average first-year MPC is $m_0 = (1-\mu)\left(1-\beta^4\right)+\mu$. We calibrate β and μ so that the annual interest rate is 2% and the annual MPC is 0.32. The latter value is consistent with the results from our survey experiments.

Auclert et al. (2024b) argue that TANK models generate counterfactual intertemporal MPCs. Consistent with their argument, the standard TANK model features intertemporal MPCs, $m_t^q \equiv \frac{\partial C_t}{\partial \varepsilon_0}$, that are inconsistent with our survey findings. Here m_t^q denotes the fraction of the initial transfer in the E1 experiment that individuals consume in quarter t. A basic property of the standard TANK model is that the MPC is high in the first quarter and low and constant thereafter. For example, in our calibrated TANK model, $m_0^q = 0.3098$, and $m_t^q = 0.0034$ for $t \geq 1$. This pattern is inconsistent with our survey results, according to which m_t^q remains elevated for a prolonged period of time (see Figure F.3 in Appendix F).

We now consider experiment E2 in a version of the TANK model where households are inattentive. Under FIRE, the average planned first-year spending response is equal to 0.44, substantially exceeding the empirical estimate of 0.32 obtained in experiment E2 (see Appendix F). This outcome reflects that the average consumption response is predominantly driven by hand-to-mouth households. So, allowing for moderately inattentive consumers does not enable the TANK model to account for the survey-based estimate of the average planned first-year spending response to a uniform transfer.

7 The Macro Consequences of Stimulus Checks

In the previous section, we argued that RANK and TANK models cannot account for the survey-based evidence from experiment E2. For this reason, we analyze the aggregate implications of uniform transfers using the calibrated inattentive HANK model. In Subsection 7.1, we assume that a fiscal deficit stemming from transfers is financed by future lump-sum taxation. In Subsection 7.4, we consider the implications of financing deficits via future distortionary labor income taxes.

7.1 The Transfer Multiplier

Panel A of Table 3 reports the first-year transfer multiplier in the HANK model under FIRE and inattention. Ricardian Equivalence does not hold in the HANK economy under FIRE because some households are liquidity constrained. In that model, the first-year transfer multiplier is 0.23, a value substantially smaller than the model-implied average MPC, 0.32. The reason is that, under FIRE, the anticipation of higher future taxes reduces aggregate demand, which acts as a partial offset to the high average MPC out of individual-specific transfers, m_0.

Panel A: The Transfer Multiplier

Model	**Response**	**% Change from FIRE**
Inattention	0.29	+26%
FIRE	0.23	–
RNE-only	0.30	+30%

Panel B: GE Attenuation

GE Component	**Change from RNE**
Inattention to Y	–0.03
Inattention to r	+0.02
GE-dampening	–0.01

Table 3: The Transfer Multiplier with Lump-sum Taxes

Notes: Panel A reports the first-year output multiplier to a transfer, financed with lump-sum taxes, under three model specifications: the inattentive HANK model, the HANK model under FIRE, and a model incorporating inattention with respect to GE effects. Panel B decomposes the GE dampening effect into components arising from aggregate output and interest rate effects.

In the inattentive HANK model, the multiplier equals 0.29, a 26 percent increase relative to the FIRE version of the model. To gain further insight into the mechanisms behind this increase in the transfer multiplier, we consider a counterfactual economy in which households are perfectly attentive to income and real interest rates, but are inattentive to future taxes. We call this the *RNE-only* economy. Formally, we solve this counterfactual economy by replacing the Jacobians with respect to income and interest rates with their

FIRE counterparts, while assuming that the response to taxes is still given by their values in the inattentive HANK model. The difference between the multiplier with inattention and the RNE-only economy measures the effects of GE dampening, i.e., how much inattention to the GE effects of the transfer on Y and r affect the final output multiplier.[20]

The third row of Panel A in Table 3 reports the transfer multiplier in the RNE-only economy. This multiplier is slightly higher than in the Inattentive HANK model (0.30 versus 0.29). So, inattention to general equilibrium forces reduces the multiplier by approximately 0.01. This finding implies that the larger transfer multiplier in the inattentive HANK model mainly reflects inattention to future taxes, rather than to GE effects.

To provide intuition for the last result, we decompose the GE dampening effect into two channels: the impact of inattention to income and the effect of inattention to interest rates. To isolate these components, we introduce a second auxiliary economy in which households are inattentive to taxes and income but are fully attentive to the real interest rate. This intermediate specification allows us to measure the marginal contribution of aggregate output inattention to the overall GE dampening effect. The difference in multipliers between the fully inattentive economy and this second auxiliary economy isolates the impact of inattention to interest rates.[21]

Consistent with Panel A, Panel B of Table 3 reports that the GE dampening effect on the transfer multiplier is quantitatively small. The modest impact reflects the offsetting effects of inattention to output and the real interest rate. Inattention to income *reduces* the multiplier by approximately 0.03, while inattention to real interest rates *increases* the multiplier by 0.02. The net effect of the two opposing effects is small.

7.2 The Dynamic Response of Economy-Wide Aggregates to Transfer Payments

Following the COVID-19 pandemic, the US government made direct payments of $931 billion to individuals, roughly 16% of quarterly GDP in 2021.[22] In this subsection, we analyze the consequences of an aggregate transfer of that size.

Figure 7.1 presents the dynamic impulse response functions for output, the real interest rate, inflation, and lump-sum taxes in response to a one-time transfer at date $t = 0$

[20]In Appendix G, we consider a tractable HANK model and solve analytically for this decomposition, gaining further insight into the elements shape the magnitude of the FIRE, RNE, and GE-dampening components of the overall transfer multiplier.

[21]By construction, the sum of the income and interest rate dampening effects is equal to the total GE dampening effect.

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

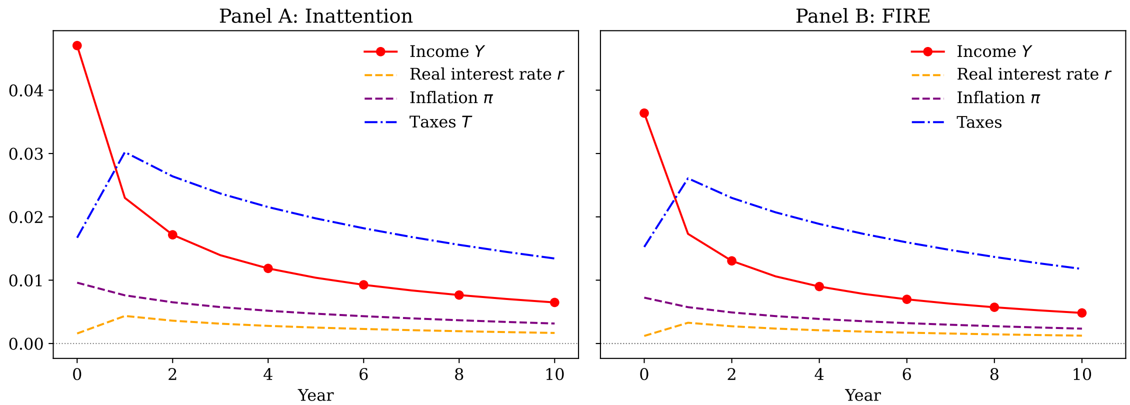

Figure 7.1: Dynamic Responses to an Unanticipated Increase in Transfers with Lump-Sum Taxes

Notes: This figure displays the economy's response to a one-time transfer shock at time zero, financed by lump-sum taxes. Panel A displays the impulse response function of output (dotted red line), total tax revenues (dash-dot blue line), the percentage point changes in inflation (dotted purple line) and the real interest rate (dash yellow line), respectively, in the inattentive HANK model. Panel B displays the analog impulse responses for the HANK model under FIRE. Inflation and the real interest are expressed as percentage point deviations from steady state. Output and taxes are expressed as percentage deviations from steady state. The size of the transfer shock is 16% of GDP.

in the model. Panels A and B display the impulse response functions in the inattentive and FIRE HANK models, respectively. For exposition purposes, we report the impulse response functions at an annual frequency, which corresponds to how we report our survey results.

Figure 7.1 shows that the effect of the transfer on output and inflation is both larger and more persistent in the inattentive HANK model than in the HANK model under FIRE. To understand the dynamic effects of inattention, Figure 7.2 displays the evolution of people's expectations that underlie the response of output to the transfer payment. The dotted lines display people's expectations about the future evolution of aggregate variables at different horizons. The solid lines correspond to the actual impulse response functions of aggregate variables. Note that people's expectations of future taxes are always muted relative to their actual values. For example, at time 0, individuals do not anticipate substantial changes in future lump-sum taxes. A concomitant of this misperception is that they also underestimate the evolution of other aggregate variables.

People revise their expectations at the beginning of each time period. Since people pay more attention to variables that are closer in time to their decisions, their expectations of lump-sum taxes and other aggregate variables at year t are closer to their actual values in that year. Nevertheless, at each point in time, people substantially underestimate the

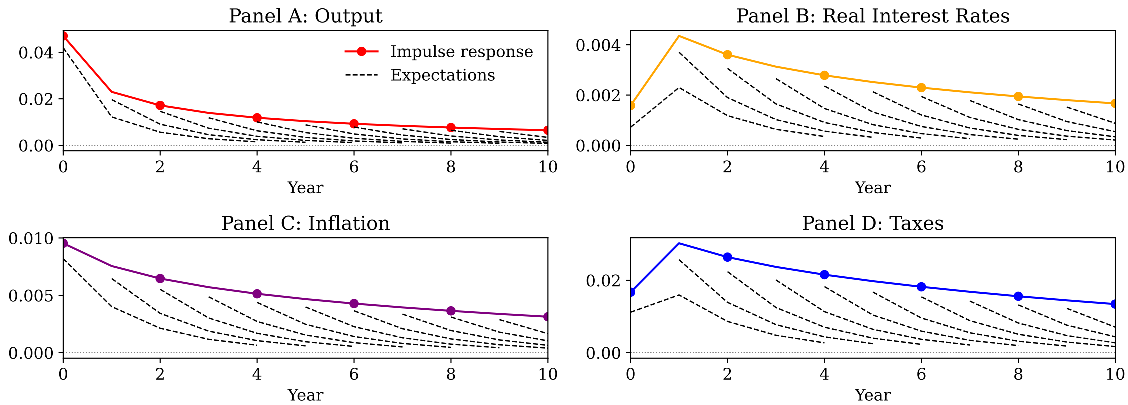

Figure 7.2: Inattentive HANK: The Evolution of Expectations to an Unanticipated Increase in Transfers with Lump-Sum Taxes

Notes: This figure displays the response of output (Panel A), the real interest rate (Panel B), inflation (Panel C), and total tax revenues (Panel D) to a one-time transfer shock at time zero, financed with lump-sum taxes, in the inattentive HANK model. In each panel the dashed lines represent people's expectations for each variable at each point in time and for different horizons. Inflation and the real interest are expressed as percentage point deviations from steady state. Output and taxes are expressed as percentage deviations from steady state. The size of the transfer shock is 16% of GDP.

magnitude of *future* taxes and future aggregate variables. This pattern of expectations about future taxes lies at the core of RNE.

7.3 How fast does the government finance deficits?

Panels A and B of Figure 7.3 display the sensitivity of aggregate output and inflation to variations in the parameter which governs the persistence of government debt. Consistent with the literature (e.g., Auclert et al., 2024b and Angeletos et al., 2024a), in the HANK model under FIRE, more persistent fiscal debt (a higher value of ρ_B) amplifies the response of output and inflation to a fiscal transfer. However, the output multiplier is larger under inattention than under FIRE for all values of ρ_B that we considered.

7.4 Distortionary Labor Taxation

In this section, we consider the case in which the government changes labor-income taxes $\mathcal{T}_t^Y$ to finance transfer payments. Future lump-sum taxes are set to zero.

Panel A of Table 4 decomposes the overall transfer multiplier into the effects of RNE and the GE dampening effect. The results are consistent with those discussed in Table 3. The transfer multiplier under inattention is 0.30, slightly larger than the value under lump-sum taxes. This result reflects the fact that labor-income taxes are more progressive

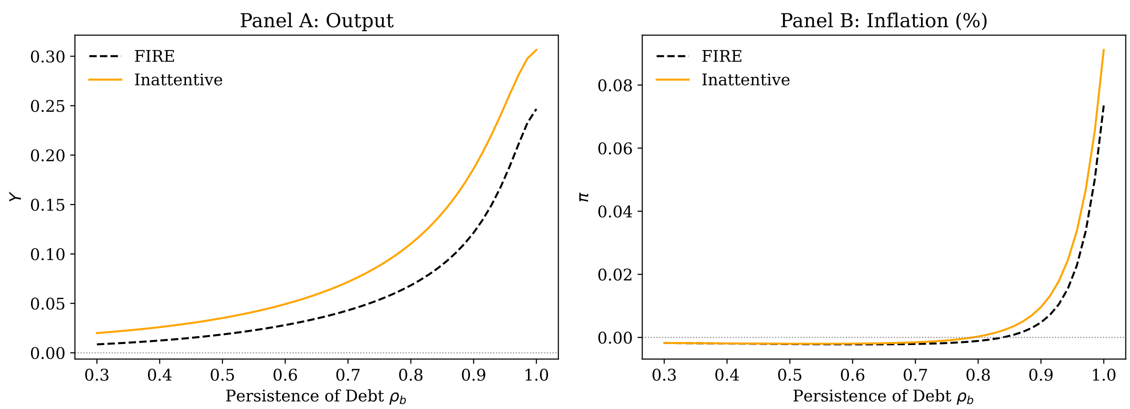

Figure 7.3: The Transfer Multiplier as a Function of the Persistence of Debt

Notes: This figure displays the first-year responses of output and inflation to a transfer at time zero, financed by lump-sum taxation, as a function of the persistence parameter ρ_B. The continuous orange line displays these responses in the inattentive HANK model, and the dashed black line displays the responses in the HANK model under FIRE. Output is expressed as percentage deviations from steady state. Inflation is expressed as percentage point deviations from steady state.

than lump-sum taxes, leading to a larger spending response. Panel B decomposes the response of aggregate output into inattention to aggregate output, the real interest rate and the net effect of inattention to the GE effects of the transfer. As in the case of lump-sum taxes, the net GE dampening effect is small relative to the impact of RNE.

Figure 7.4 displays the dynamic responses of output, inflation, real interest rates, and the tax rate under inattention (Panel A) and FIRE (Panel B). Comparing Figure 7.4 to Figure 7.1, we see that the results under distortionary and lump-sum taxes taxes are similar.

Panel A: The Transfer Multiplier

Model	**Response**	**% Change from FIRE**
Inattention	0.30	25%
FIRE	0.24	–
RNE-only	0.30	25%

Panel B: GE Attenuation

GE Component	**Change from RNE**
Inattention to Y	–0.03
Inattention to r	+0.03
GE-dampening	0.00

Table 4: The Transfer Multiplier with Labor-Income Taxation

Notes: Panel A reports the first-year output multiplier to a transfer, financed with labor-income taxes, under three model specifications: the inattentive HANK model, the HANK model under FIRE, and a model incorporating inattention with respect to GE effects. Panel B decomposes the GE dampening effect into components arising from aggregate output and interest rate effects.

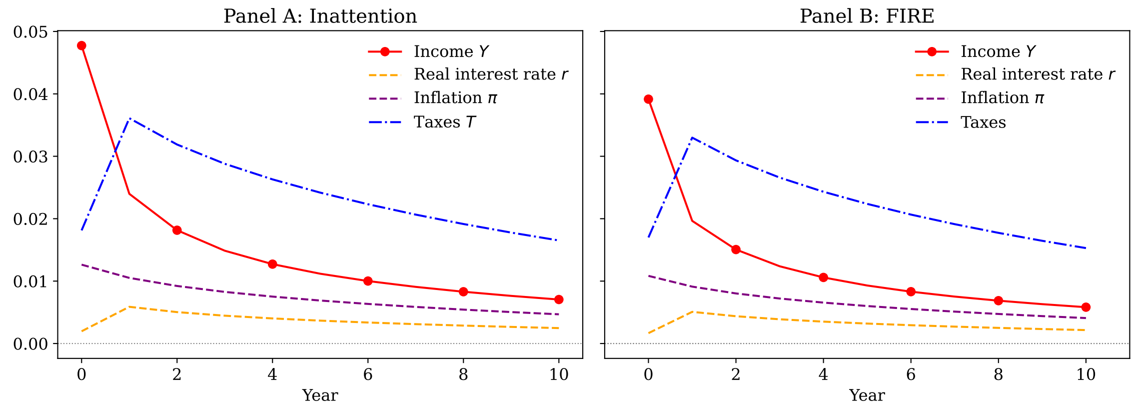

Figure 7.4: Dynamic Responses to an Unanticipated Increase in Transfers with Labor-Income Taxation

Notes: This figure displays the economy's response to a one-time transfer shock at time zero, financed by labor-income taxes. Panel A displays the impulse response function of output (dotted red line), total tax revenues (dash-dot blue line), the percentage point changes in inflation (dotted purple line) and the real interest rate (dash yellow line), respectively, in the inattentive HANK model. Panel B displays the analog impulse responses for the HANK model under FIRE. Inflation and the real interest are expressed as percentage point deviations from steady state. Output and taxes are expressed as percentage deviations from steady state. The size of the transfer shock is 16% of quarterly GDP.

8 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 distortionary income taxation case. The debt rule is given by $B_{t+1} = (1-\rho_b)\,B + \rho_b B_t + \rho_b\,(G_t - G)$. As in Auclert et al. (2024b), we assume that $dG_t = \rho_G^t dG_0$ where $\rho_G = 0.934$, implying an annual spending persistence parameter of 0.76.

8.1 The Fiscal-Spending Multiplier

Define the first-year government-spending multiplier as

$$\frac{\sum_{t=0}^{3}(1+r)^{-t}\,dY_t}{\sum_{t=0}^{3}(1+r)^{-t}\,dG_t}.$$

Panel A of Table 5 reports the first-year government spending multiplier in the HANK model under FIRE and under inattention. Under FIRE, the first-year value of this multiplier under FIRE is 0.95, implying that consumption *falls* after the increase in government spending. In contrast, under inattention, the multiplier is 1.09, implying that consumption *rises* after the increase in government spending.

To further analyze the effects of inattention, we consider the RNE economy in which people are inattentive to taxes but fully attentive to all other GE channels. The procedure that we use to calculate the equilibrium in this economy is the same as the one discussed in Section 7.1. The fiscal-spending multiplier in the RNE-only economy is equal to 1.15, a value larger than the multiplier under full inattention. As in the response to the transfer shock, the GE dampening effect is small but negative. The small magnitude reflects opposing forces from inattention to income and real interest rates.

Panel A: Fiscal-Spending Multiplier			Panel B: GE Dampening	
Model	**Response**	**% Change from FIRE**	**GE Component**	**Change from RNE**
Inattention	1.09	+15%	*Inattention to Y*	–0.18
FIRE	0.95	–	*Inattention to r*	+0.12
RNE-only	1.15	+21%	*GE Dampening*	–0.07

Table 5: The Fiscal-Spending Multiplier

Notes: Panel A reports the first-year output multiplier to an increase in government spending, financed with labor-income taxes, under three model specifications: the inattentive HANK model, the HANK model under FIRE, and a model incorporating inattention with respect to GE effects. Panel B decomposes the GE dampening effect into components arising from aggregate output and interest rate effects.

8.2 The Dynamic Response of Economy-Wide Aggregates to an Increase in Fiscal Spending

Figure 8.1 presents the dynamic impulse response functions for output, the real interest rate, inflation, and lump-sum taxes to a government spending shock. For comparability to the transfer case, we set the initial spending shock equal to 16% of quarterly GDP. Panels A and Panel B display the impulse response functions (at an annual frequency) in the HANK economy under inattention and FIRE, respectively. The key result is that fiscal spending leads to a larger and more persistent rise in output and inflation under inattention than under FIRE.

9 Conclusions

This paper provides empirical evidence that people do not internalize future tax liabilities stemming from government transfers into their spending plans. Specifically, we design and implement a novel survey to measure households' planned spending responses

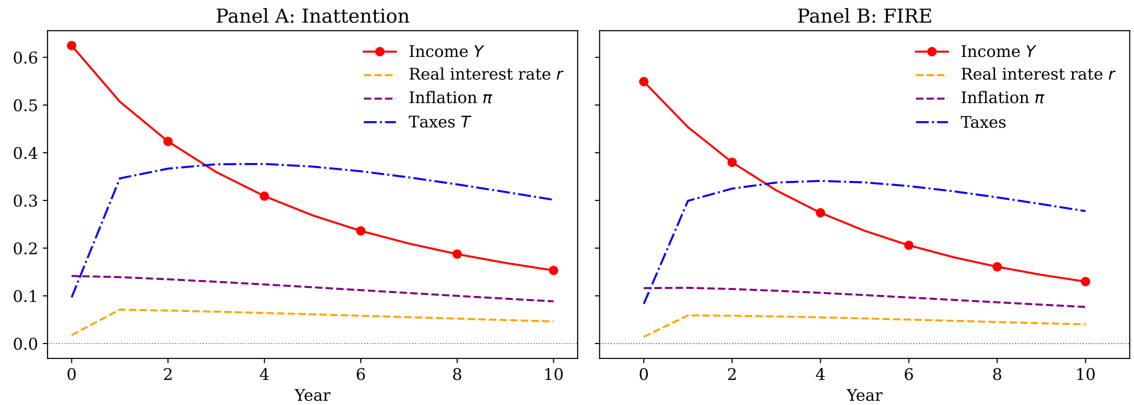

Figure 8.1: Dynamic Responses to an Unanticipated Increase in Fiscal Spending

Notes: This figure displays the economy's response to a n increase in government spending at time zero, financed by labor-income taxes. Panel A displays the impulse response function of output (dotted red line), total tax revenues (dash-dot blue line), the percentage point changes in inflation (dotted purple line) and the real interest rate (dash yellow line), respectively, in the inattentive HANK model. Panel B displays the analog impulse responses for the HANK model under FIRE. Inflation and the real interest are expressed as percentage point deviations from steady state. Output and taxes are expressed as percentage deviations from steady state. The size of the initial spending shock is 16% of quarterly GDP.

under alternative policy scenarios. Our results indicate that people exhibit a stronger spending response to government transfers, relative to the FIRE benchmark.

We embed a model of inattention into a HANK model and demonstrate that Ricardian Non-Equivalence substantially magnifies the aggregate impact of transfers and government spending on the economy. Critically, inattention renders the HANK model consistent with our central empirical finding: people's planned propensity to spend out of aggregate government transfers is the same as their marginal propensity to consume. Taken together, our results suggest that fiscal policy can significantly impact economic activity and play a useful role in stabilization policy.

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

References

ADAMS, J. J. AND C. MATTHES (2026): "How Ricardian Are We?" Tech. rep.

ANDRE, P., J. P. FLYNN, G. NIKOLAKOUDIS, AND K. SASTRY (2025): "Quick-Fixing: Near-

Rationality in Consumption and Savings Behavior," Tech. rep., National Bureau of Economic Research.

ANGELETOS, G.-M., J. GUERREIRO, AND D. R. ZHANG (2025): "From RANK to HANK, without FIRE," Tech. rep., National Bureau of Economic Research.

ANGELETOS, G.-M. AND Z. HUO (2021): "Myopia and Anchoring," *American Economic Review*, 111, 1166–1200.

ANGELETOS, G.-M. AND C. LIAN (2017): "Dampening General Equilibrium: From Micro to Macro," Tech. rep., National Bureau of Economic Research.

——— (2023): "Dampening General Equilibrium: Incomplete Information and Bounded Rationality," in *Handbook of Economic Expectations*, Elsevier, 613–645.

ANGELETOS, G.-M., C. LIAN, AND C. K. WOLF (2024a): "Can Deficits Finance Themselves?" *Econometrica*, 92, 1351–1390.

——— (2024b): "Deficits and Inflation: HANK meets FTPL," Working Paper 33102, National Bureau of Economic Research.

AUCLERT, A., M. ROGNLIE, AND L. STRAUB (2020): "Micro Jumps, Macro Humps: Monetary Policy and Business Cycles in an Estimated HANK Model," Working Paper 26647, National Bureau of Economic Research.

——— (2024a): "Fiscal and Monetary Policy with Heterogeneous Agents," *Annual Review of Economics*, 17.

——— (2024b): "The Intertemporal Keynesian Cross," *Journal of Political Economy*, 132, 4068–4121.

BAKER, S., R. FARROKHNIA, S. MEYER, M. PAGEL, AND C. YANNELIS (2023): "Income, Liquidity, and the Consumption Response to the 2020 Economic Stimulus Payments," *Review of Finance*, 27, 2271–2304.

BARDÓCZY, B. AND J. GUERREIRO (2023): "Unemployment Insurance in Macroeconomic Stabilization with Imperfect Expectations," *Manuscript, April*.

BARRO, R. J. (1974): "Are Government Bonds Net Wealth?" *Journal of Political Economy*, 82, 1095–1117.

——— (1979): "On the Determination of the Public Debt," *Journal of Political Economy*, 87, 940–971.

——— (1996): "Reflections on Ricardian Equivalence," Working Paper 5502, National Bureau of Economic Research.

Barro, R. J. and F. Bianchi (2024): "Fiscal Influences on Inflation in OECD Countries, 2020-2023," *NBER Working Paper*.

Bernard, R. (2023): *Mental Accounting and the Marginal Propensity to Consume*, 13/2023, Deutsche Bundesbank Discussion Paper.

Bernheim, B. D. (1987): "Ricardian Equivalence: An Evaluation of Theory and Evidence," *NBER Macroeconomics Annual*, 2, 263–304.

Bianchi-Vimercati, R., M. Eichenbaum, and J. Guerreiro (2024): "Fiscal Stimulus with Imperfect Expectations: Spending vs. Tax Policy," *Journal of Economic Theory*, 105814.

Bilbiie, F. O. (2008): "Limited Asset Markets Participation, Monetary Policy and (Inverted) Aggregate Demand Logic," *Journal of economic theory*, 140, 162–196.

Blanchard, O. J. (1985): "Debt, Deficits, and Finite Horizons," *Journal of Political Economy*, 93, 223–247.

Boehm, J., E. Fize, and X. Jaravel (2025): "Five Facts About MPCs: Evidence from a Randomized Experiment," *American Economic Review*, 115, 1–42.

Borusyak, K., X. Jaravel, and J. Spiess (2024): "Revisiting Event-Study Designs: Robust and Efficient Estimation," *Review of Economic Studies*, 91, 3253–3285.

Broda, C. and J. A. Parker (2014): "The Economic Stimulus Payments of 2008 and the Aggregate Demand for Consumption," *Journal of Monetary Economics*, 68, S20–S36.

Bunn, P., J. Le Roux, K. Reinold, and P. Surico (2018): "The Consumption Response to Positive and Negative Income Shocks," *Journal of Monetary Economics*, 96, 1–15.

Campbell, J. Y. and N. G. Mankiw (1989): "Consumption, Income, and Interest Rates: Reinterpreting the Time Series Evidence," *NBER macroeconomics annual*, 4, 185–216.

Carroll, C. D., E. Crawley, J. Slacalek, K. Tokuoka, and M. N. White (2020): "Sticky Expectations and Consumption Dynamics," *American Economic Journal: Macroeconomics*, 12, 40–76.

Chetty, R., A. Guren, D. Manoli, and A. Weber (2011): "Are Micro and Macro Labor Supply Elasticities Consistent? A Review of Evidence on the Intensive and Extensive Margins," *American Economic Review*, 101, 471–475.

Christelis, D., D. Georgarakos, T. Jappelli, L. Pistaferri, and M. Van Rooij (2019): "Asymmetric Consumption Effects of Transitory Income Shocks," *The Economic Journal*, 129, 2322–2341.

CHRISTIANO, L., M. EICHENBAUM, AND S. REBELO (2011): "When is the Government Spending Multiplier Large?" *Journal of Political Economy*, 119, 78–121.

CHRISTIANO, L. J., M. EICHENBAUM, AND C. L. EVANS (2005): "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy," *Journal of political Economy*, 113, 1–45.

COCHRANE, J. H. (2023): *The Fiscal Theory of the Price Level*, Princeton, NJ: Princeton University Press.

COIBION, O., D. GEORGARAKOS, Y. GORODNICHENKO, AND M. VAN ROOIJ (2023): "How Does Consumption Respond to News About Inflation? Field Evidence from a Randomized Control Trial," *American Economic Journal: Macroeconomics*, 15, 109–152.

COIBION, O. AND Y. GORODNICHENKO (2012): "What Can Survey Forecasts Tell Us About Information Rigidities?" *Journal of Political Economy*, 120, 116–159.

——— (2015): "Information Rigidity and the Expectations Formation Process: A Simple Framework and New Facts," *American Economic Review*, 105, 2644–2678.

COIBION, O., Y. GORODNICHENKO, AND M. WEBER (2020): "How Did US Consumers Use Their Stimulus Payments?" Tech. rep., National Bureau of Economic Research.

——— (2022): "Monetary Policy Communications and Their Effects on Household Inflation Expectations," *Journal of Political Economy*, 130, 1537–1584.

COLARIETI, R., P. MEI, AND S. STANTCHEVA (2024): "The How and Why of Household Reactions to Income Shocks," Working Paper 32191, National Bureau of Economic Research.

DIAMOND, P. A. (1965): "National Debt in a Neoclassical Growth Model," *American Economic Review*, 55, 1126–1150.

DRESCHER, K., P. FESSLER, AND P. LINDNER (2020): "Helicopter Money in Europe: New Evidence on the Marginal Propensity to Consume Across European Households," *Economics Letters*, 195, 109416.

ELMENDORF, D. W. AND N. G. MANKIW (1999): "Government Debt," *Handbook of Macroeconomics*, 1, 1615–1669.

ENKE, B. (2024): "The Cognitive Turn in Behavioral Economics," Tech. rep., Working Paper.

ENKE, B. AND T. GRAEBER (2023): "Cognitive Uncertainty," *The Quarterly Journal of Economics*, 138, 2021–2067.

ENKE, B., T. GRAEBER, R. OPREA, AND J. YANG (2024): "Behavioral Attenuation," Tech. rep., National Bureau of Economic Research.

Erceg, C. J., D. W. Henderson, and A. T. Levin (2000): "Optimal Monetary Policy with Staggered Wage and Price Contracts," *Journal of monetary Economics*, 46, 281–313.

Fagereng, A., M. B. Holm, and G. J. Natvik (2021): "MPC Heterogeneity and Household Balance Sheets," *American Economic Journal: Macroeconomics*, 13, 1–54.

Farhi, E., A. Olivi, and I. Werning (2022): "Price Theory for Incomplete Markets," Tech. rep., National Bureau of Economic Research.

Farhi, E., M. Petri, and I. Werning (2020): "The Fiscal Multiplier Puzzle: Liquidity Traps, Bounded Rationality, and Incomplete Markets," mimeo.

Farhi, E. and I. Werning (2019): "Monetary Policy, Bounded Rationality, and Incomplete Markets," *American Economic Review*, 109, 3887–3928.

Flood, S., M. King, R. Rodgers, S. Ruggles, J. R. Warren, D. Backman, A. Chen, G. Cooper, S. Richards, M. Schouweiler, and M. Westberry (2023): "IPUMS CPS: Version 11.0 [Dataset]," Dataset, Minneapolis, MN: IPUMS.

Fuster, A., G. Kaplan, and B. Zafar (2021): "What Would You Do With $500? Spending Responses to Gains, Losses, News, and Loans," *The Review of Economic Studies*, 88, 1760–1795.

Gabaix, X. (2014): "A Sparsity-Based Model of Bounded Rationality," *The Quarterly Journal of Economics*, 129, 1661–1710.

——— (2019): "Behavioral Inattention," in *Handbook of Behavioral Economics: Applications and Foundations 1*, Elsevier, vol. 2, 261–343.

——— (2020): "A Behavioral New Keynesian Model," *American Economic Review*, 110, 2271–2327.

Galí, J. (2008): *Monetary Policy, Inflation, and the Business Cycle: An Introduction to the New Keynesian Framework*, Princeton University Press.

Ganong, P. and P. Noel (2020): "Liquidity Versus Wealth in Household Debt Obligations: Evidence from Housing Policy in the Great Recession," *American Economic Review*, 110, 3100–3138.

García-Schmidt, M. and M. Woodford (2019): "Are Low Interest Rates Deflationary? A Paradox of Perfect-Foresight Analysis," *American Economic Review*, 109, 86–120.

Guerreiro, J. (2023): "Belief Disagreement and Business Cycles," .

Hazell, J., J. Herreno, E. Nakamura, and J. Steinsson (2022): "The Slope of the Phillips Curve: Evidence from US States," *The Quarterly Journal of Economics*, 137, 1299–1344.

HAZELL, J. AND S. HOBLER (2024): "Do Deficits Cause Inflation?: A High Frequency Narrative Approach," Tech. rep.

HEATHCOTE, J., K. STORESLETTEN, AND G. L. VIOLANTE (2017): "Optimal Tax Progressivity: An Analytical Framework," *The Quarterly Journal of Economics*, 132, 1693–1754.

HUBBARD, R. G. AND K. L. JUDD (1986): "Liquidity Constraints, Fiscal Policy, and Consumption," *Brookings Papers on Economic Activity*, 1986, 1–60.

ILUT, C. AND R. VALCHEV (2023): "Economic Agents as Imperfect Problem Solvers," *The Quarterly Journal of Economics*, 138, 313–362.

JAPPELLI, T. AND L. PISTAFERRI (2014): "Fiscal Policy and MPC Heterogeneity," *American Economic Journal: Macroeconomics*, 6, 107–136.

KOŞAR, G., D. MELCANGI, L. PILOSSOPH, AND D. G. WICZER (2023): "Stimulus Through Insurance: The Marginal Propensity to Repay Debt," .

KOTSOGIANNIS, C. AND P. SAKELLARIS (2025): "MPCs Estimated from Tax Lottery, Survey and Administrative Data," Tech. rep., Tech. rep.

LEWIS, D., D. MELCANGI, AND L. PILOSSOPH (2024): "Latent Heterogeneity in the Marginal Propensity to Consume," Tech. rep., National Bureau of Economic Research.

LUCAS JR, R. E. (1972): "Expectations and the Neutrality of Money," *Journal of economic theory*, 4, 103–124.

MAĆKOWIAK, B., F. MATĚJKA, AND M. WIEDERHOLT (2023): "Rational Inattention: A Review," *Journal of Economic Literature*, 61, 226–273.

MANKIW, N. G. AND R. REIS (2002): "Sticky Information Versus Sticky Prices: A Proposal to Replace the New Keynesian Phillips Curve," *The Quarterly Journal of Economics*, 117, 1295–1328.

MCKAY, A. AND C. WOLF (2022): "Optimal Policy Rules in HANK," *Manuscript, January*, 121–144.

MEI, P. AND L. WU (2024): "Thinking about the Economy, Deep or Shallow?" Tech. rep., Harvard University.

O'DRISCOLL JR, G. P. (1977): "The Ricardian Nonequivalence Theorem," *Journal of Political Economy*, 85, 207–210.

ORCHARD, J. D., V. A. RAMEY, AND J. F. WIELAND (2025): "Micro MPCs and Macro Counterfactuals: The Case of the 2008 Rebates," *The Quarterly Journal of Economics*, qjaf015.

PARKER, J. A., J. SCHILD, L. ERHARD, AND D. JOHNSON (2022): "Household Spending Responses to the Economic Impact Payments of 2020: Evidence from the Consumer Expenditure Survey," Tech. rep., National Bureau of Economic Research.

PARKER, J. A. AND N. S. SOULELES (2019): "Reported Effects Versus Revealed-Preference Estimates: Evidence from the Propensity to Spend Tax Rebates," *American Economic Review: Insights*, 1, 273–290.

PARKER, J. A., N. S. SOULELES, D. S. JOHNSON, AND R. MCCLELLAND (2013): "Consumer Spending and the Economic Stimulus Payments of 2008," *American Economic Review*, 103, 2530–2553.

PFÄUTI, O. AND F. SEYRICH (2022): "A Behavioral Heterogeneous Agent New Keynesian Model," .

POTERBA, J. M. AND L. H. SUMMERS (1987): "Finite Lifetimes and the Effects of Budget Deficits on National Saving," *Journal of Monetary Economics*, 20, 369–391.

RICARDO, D. (1817): *On the Principles of Political Economy and Taxation*, London: John Murray, includes essays on the funding system.

ROTH, C. AND J. WOHLFART (2020): "How Do Expectations About the Macroeconomy Affect Personal Expectations and Behavior?" *Review of Economics and Statistics*, 102, 731–748.

SCHMITT-GROHÉ, S. AND M. URIBE (2005): "Optimal Fiscal and Monetary Policy in a Medium-Scale Macroeconomic Model," *NBER Macroeconomics Annual*, 20, 383–425.

SHAPIRO, M. D. AND J. SLEMROD (2003): "Consumer Response to Tax Rebates," *American Economic Review*, 93, 381–396.

SIMS, C. A. (2003): "Implications of Rational Inattention," *Journal of monetary Economics*, 50, 665–690.

STANTCHEVA, S. (2023): "How to Run Surveys: A Guide to Creating your Own Identifying Variation and Revealing the Invisible," *Annual Review of Economics*, 15, 205–234.

TAUBINSKY, D., L. BUTERA, M. SACCAROLA, AND C. LIAN (2024): "Beliefs About the Economy are Excessively Sensitive to Household-Level Shocks: Evidence from Linked Survey and Administrative Data," Working Paper 32664, National Bureau of Economic Research.

WOODFORD, M. (1990): "Public Debt as Private Liquidity," *The American Economic Review*, 80, 382–388.

——— (2003a): "Imperfect Common Knowledge and the Effects of Monetary Policy," *Knowledge, information, and expectations in modern macroeconomics: In honor of Edmund S. Phelps*, 25, 4.

——— (2003b): *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton, NJ: Princeton University Press.

——— (2019): "Monetary Policy Analysis When Planning Horizons are Finite," *NBER macroeconomics annual*, 33, 1–50.

WOODFORD, M. AND Y. XIE (2019): "Policy Options at the Zero Lower Bound When Foresight is Limited," in *AEA Papers and Proceedings*, American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203, vol. 109, 433–437.

——— (2022): "Fiscal and Monetary Stabilization Policy at the Zero Lower Bound: Consequences of Limited Foresight," *Journal of Monetary Economics*, 125, 18–35.

Appendix for Ricardian Non-Equivalence

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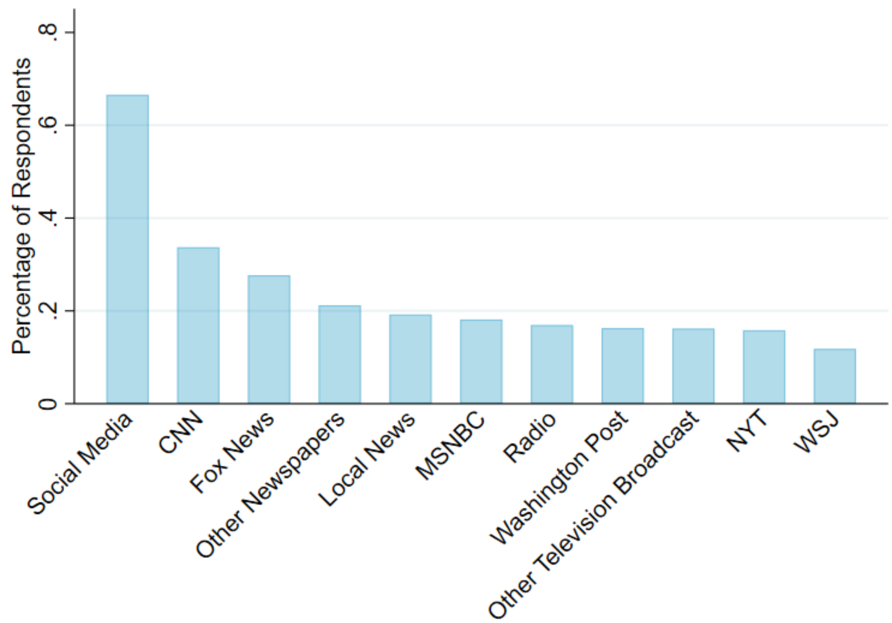
A Additional Figures

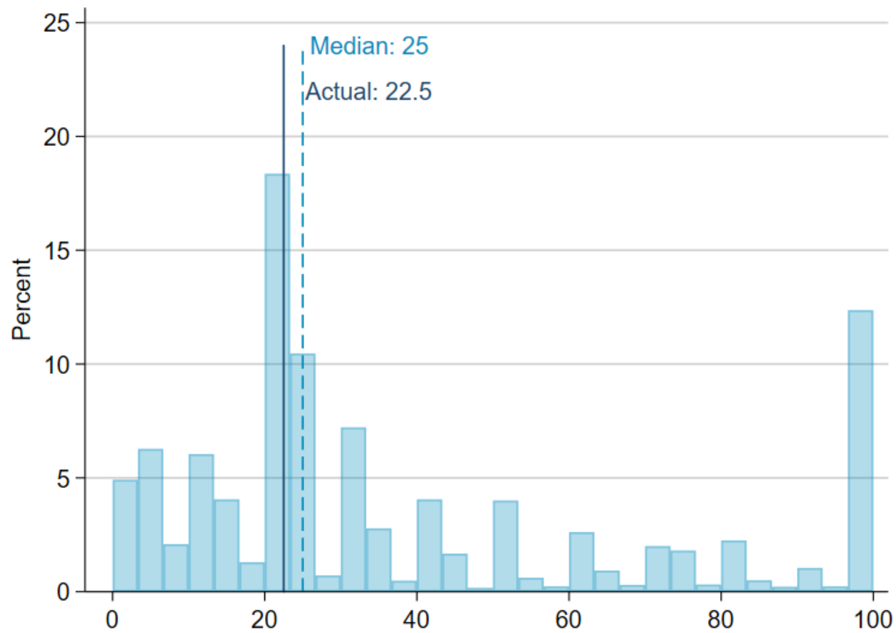
Figure A.1: Information Acquisition: Types of Sources Used



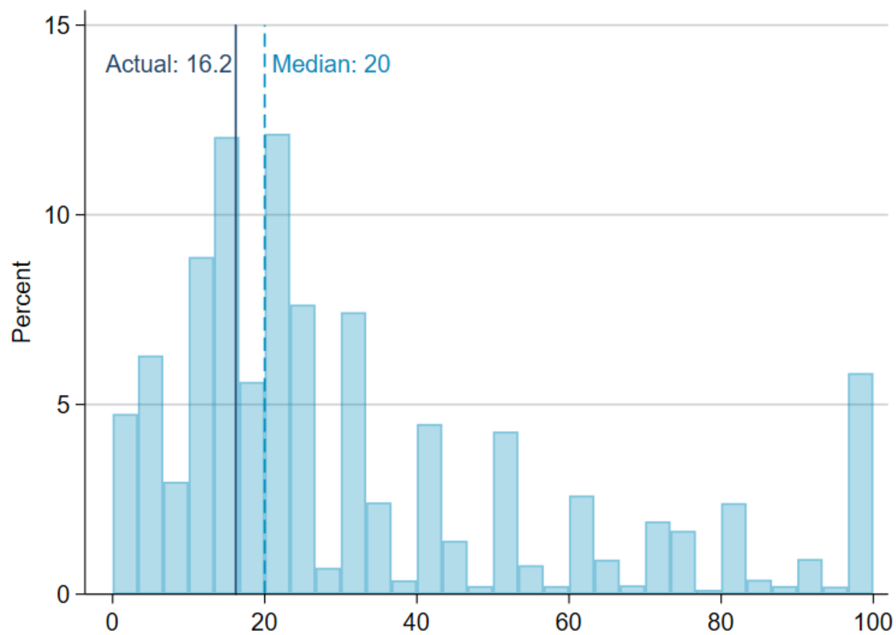
Notes: This figure illustrates the distribution of responses to the question: "What are your sources of news about the U.S. economy?" It displays the percentage of respondents who selected each source from a predefined set of options.

Figure A.2: People's Perceptions of the US Fiscal Situation

Panel A: Federal Spending

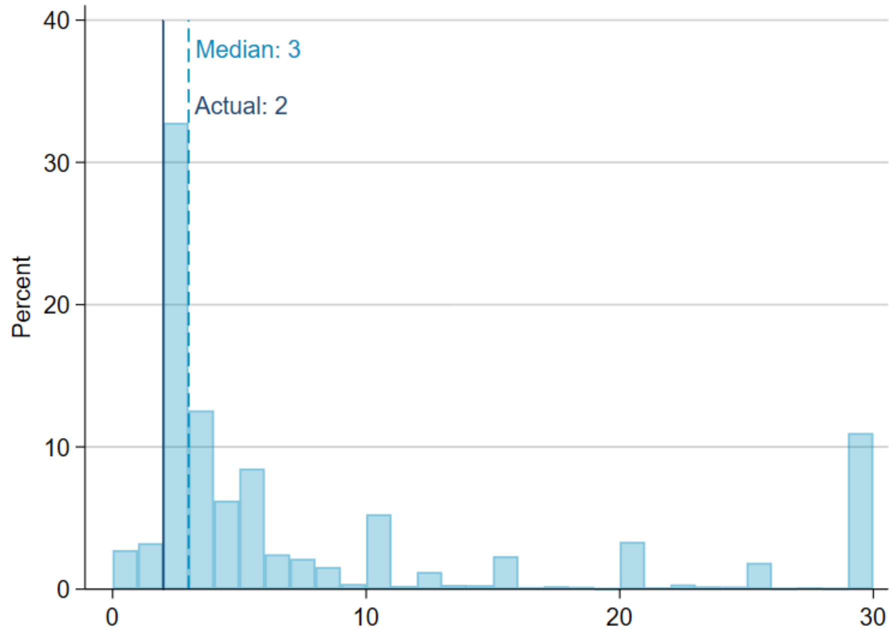


Panel B: Federal Taxes



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 and tax revenue 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?" To enhance interpretability, the data has been top-coded, replacing values above 100 percent with 100. The median estimates provided by respondents are indicated with dashed lines, while the actual values are represented by solid lines.

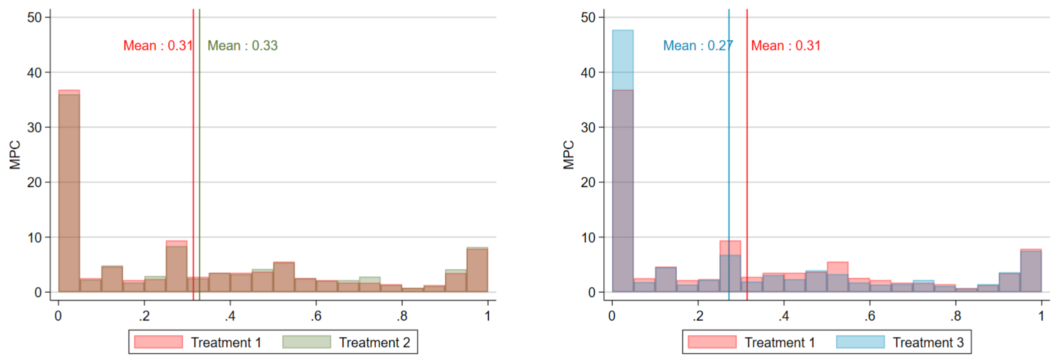
Figure A.3: People's Perception of the Federal Reserve Bank's Inflation Target



Notes: This figure presents the distribution of responses to three survey questions regarding the Federal Reserve Bank's inflation target: "What is the Federal Reserve Banks target inflation rate over the long run?" To enhance interpretability, the data have been top-coded and bottom-coded: values above 30 are set to 30, and values below 0 are set to 0. The median estimates provided by respondents are indicated with dashed lines, while the actual true values are represented by solid lines.

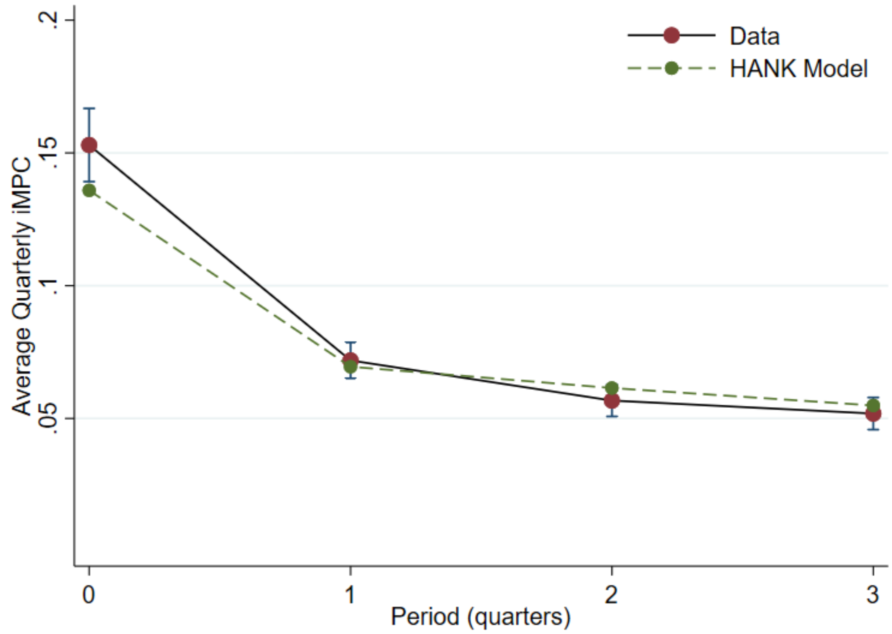
Figure A.4: Distribution of Marginal Propensities to Consume

Panel A: E1 and E2 Panel B: E1 and E3



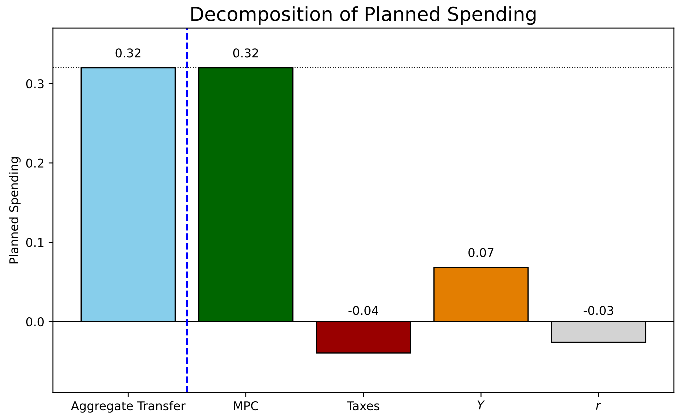
Notes: The figure presents the distribution of estimated marginal propensities to consume (MPC) across different experimental Experiments. We aggregate respondents' spending to an annual frequency. The MPC is computed as total present-value of spending over the first year divided by $ 1,400. To ensure interpretability, values greater than one were top-coded to 1. Panel A compares Experiment 1 (individual cash transfer) and Experiment 2 (universal cash transfer). Panel B compares Experiment 1 and Experiment 3 (universal cash transfer with information about future taxation). The mean MPC for each Experiment is indicated in the figure.

Figure A.5: Quarterly iMPCs in Canonical HANK Model vs. Data



Notes: This figure displays the quarterly intertemporal marginal propensities to consume (iMPCs) in our survey evidence (Data) and implied by the calibrated Heterogeneous-Agent New Keynesian model (HANK model) out of the 1,400 dollar individual transfer in Experiment 1. The quarterly iMPCs compute the fraction of the transfer the average individual consumes in the initial quarter, and in the second, third, and fourth quarters respectively. Values above the 99th percentile are set equal to the 99th-percentile value for each expirement and quarter.

Figure A.6: Inattentive HANK: The Marginal Propensity to Spend out of Transfers with Labor-Income Taxation



Notes: This figure presents the decomposition of the marginal propensity to spend out of an aggregate transfer in the inattentive HANK model). The bars correspond to the respective components of the analytical expression for $\frac{\partial C_0^{\text{annual}}}{\partial \varepsilon_0}$ derived in equation (5.2). The green bar captures the direct marginal propensity to consume out of an individual transfer (m_0). The red bar reflects the dampening effect of future labor-income taxes ($-\sum_t M_t^Y \cdot \frac{d\mathcal{T}_t^Y}{d\varepsilon_0}$), while the orange bar corresponds to the positive general equilibrium response of income ($\sum_t M_t^Y \cdot dY_t$). The gray bar denotes the effect of changes in real interest rates through the monetary policy response ($\sum_t M_t^r \cdot dr_t$). The sum of all components yields the aggregate spending response to the transfer.

B Additional Tables

Table B.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%	28%
	Republican	30%	26%
	Independent/Non-affiliated	36%	33%
	Other	2%	6%
	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	73%	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	2%	4%
	Secondary education	3%	4%
	High school diploma	39%	42%
	Technical/community college	14%	11%
	Undergraduate degree	27%	25%
	Graduate degree	12%	12%
	Doctorate degree	2%	2%

Notes: This table compares the distribution of respondent characteristics in the survey sample to benchmark population shares for the United States. Each cell reports the percentage of individuals in the corresponding column who fall into the listed category. US benchmark shares are computed from IPUMS CPS 2024 microdata; employment status benchmarks use IPUMS CPS ASEC 2024. All population shares use the relevant CPS sampling weights.

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

		E1	**E2**	**E3**
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	37%	35%	37%
	Other	2%	2%	2%
Age Group	22-30 years old	31%	31%	28%
	31-40 years old	31%	31%	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%	65%	66%
	Black or African American	18%	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	4%	3%	6%
Education	No formal education	2%	2%	3%
	Secondary education	3%	3%	2%
	High school diploma	40%	39%	38%
	Technical/community college	15%	13%	15%
	Undergraduate degree	26%	27%	27%
	Graduate degree	13%	12%	13%
	Doctorate degree	2%	3%	2%

Notes: This table reports the distribution of respondent characteristics separately for Experiments E1, E2, and E3. Each entry is the column percentage: the share of respondents within a given experiment who fall into the listed category.

C Additional Results for Section 3

C.1 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.[23] 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 has on their tax expectations. These elicited expectations allow us to examine how different experiments influence perceptions of future taxes.[24]

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

$$E_i^{\text{Post}}\left[\Delta t_h\right] = \alpha_h + \gamma_{2,h}\mathcal{I}_{i,2} + \gamma_{3,h}\mathcal{I}_{i,3} + \varrho_h E_i^{\text{Pre}}\left[\Delta t_h\right] + \xi_{i,h}, \tag{C.1}$$

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 on the value of 1 if an individual is assigned to Experiment 2 or Experiment 3, respectively, and 0 otherwise.

The regression results are presented graphically in Figure C.1 and summarized in Appendix Table C.1. Experiments 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 an experiment in which the future tax implications of current deficits remain implicit.

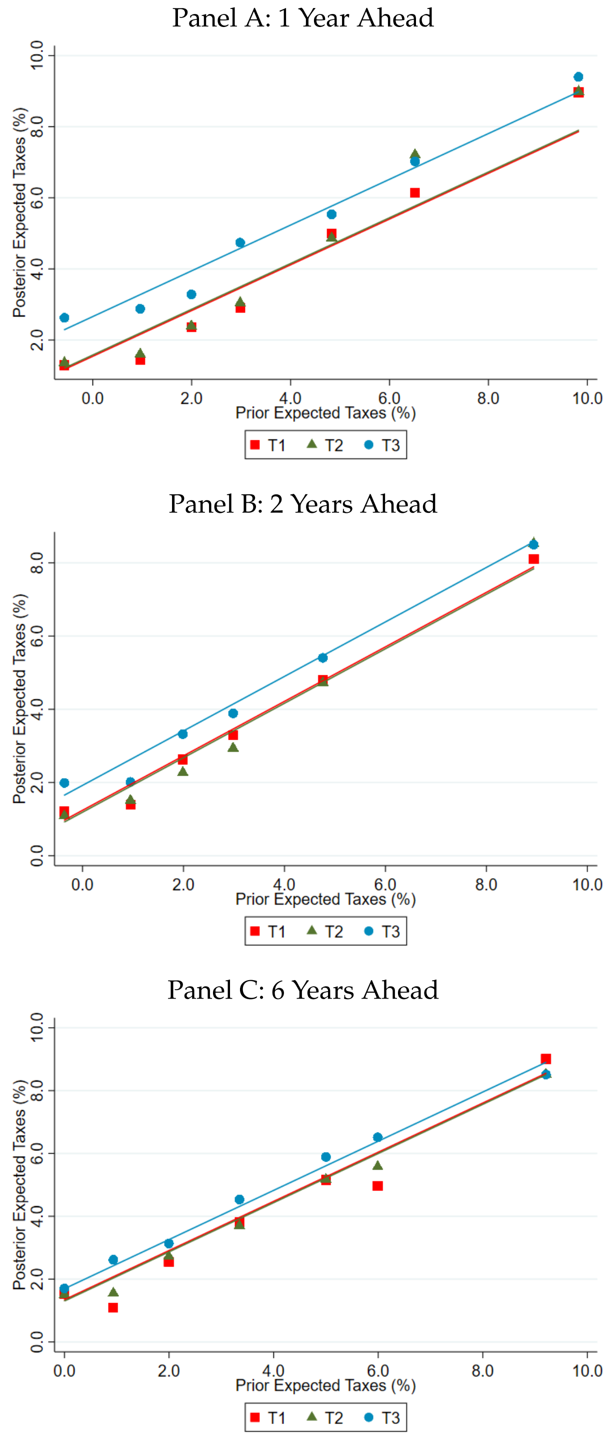
In contrast, Experiment 3 (E3) leads to a pronounced upward revision of tax expectations, except in the long run (6-year ahead). This finding indicates that providing explicit information about future taxation significantly impacts individuals' beliefs about their tax burden. Notably, respondents revise their expected tax liabilities not only for the following year but also for the two-year-ahead horizon,

[23] 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.

[24] 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 C.2 for income expectations, C.3 for interest rate expectations, and C.4 for inflation expectations.

suggesting a broader adjustment in their expectations about the trajectory of fiscal policy.

Figure C.1: Expectations of Taxes Before and After Experiment



Notes: This figure presents the relationship between prior and posterior expected taxes across experiments and at different time horizons. For each experiment, we restrict the sample to respondents with prior expected taxes at or below 10 percentage points, divide this range into 10 equally sized bins, and plot the average posterior expected taxes within each bin after trimming the bottom and top 1 percent of posterior observations. The fitted lines show predicted values from the regression in equation (3.5) estimated on the same restricted sample. Panels A, B and C report responses for the 1, 2 and 6 year ahead horizon, respectively.

C.2 Expectations about other variables

We find that, for the most part, none of the Experiments significantly affect individuals' expectations about their income growth or interest rates. However, Experiment E3 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, Experiment E2 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 E3—should lead to lower, rather than higher, inflation expectations.[25,26]

Table C.1: Tax Expectations

Horizon	1 year		2 years		6 years	
Experiment 2	0.022	0.053	-0.274	-0.022	-0.360	-0.031
	(0.257)	(0.187)	(0.234)	(0.168)	(0.300)	(0.215)
Experiment 3	0.812***	1.008***	0.707***	0.899***	0.284	0.329
	(0.259)	(0.188)	(0.235)	(0.170)	(0.300)	(0.216)
Prior		✓		✓		✓
Observations	5,764	5,697	5,728	5,630	5,746	5,631

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

Notes: The table reports OLS regressions of posterior expected taxes at 1, 2 and 6 year ahead horizon for Experiments 2 and 3. Columns with a check mark in the row labeled Prior additionally control for prior expected taxes at the corresponding horizon. Prior and posterior expectations are trimmed at the 1st and 99th percentiles. Standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[25] 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).

[26] One possible explanation for this anomaly is that individuals' forecasts are influenced by selective 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 E3 may lead individuals to adopt a more pessimistic outlook about future inflation. Investigating this potential mechanism lies beyond the scope of this paper.

Table C.2: Income Expectations

Horizon	1 year		2 years		6 years	
Experiment 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)
Experiment 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 C.3: Interest Rate Expectations

Horizon	1 year		2 years		6 years	
Experiment 2	-0.062	-0.061	-0.112	-0.022	-0.123	-0.084
	(0.151)	(0.100)	(0.176)	(0.115)	(0.223)	(0.143)
Experiment 3	0.154	0.077	0.106	0.024	-0.130	-0.356**
	(0.152)	(0.101)	(0.177)	(0.115)	(0.224)	(0.144)
Prior		✓		✓		✓
N	5,804	5,663	5,801	5,679	5,836	5,712

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

Notes: The table reports the coefficient from OLS regressions of posterior expected interest rates at the 1, 2 and 6 year ahead horizon horizon for Experiments 2 and 3. Columns with a check mark in the row labeled Prior additionally control for prior expected taxes at the corresponding horizon. Prior and posterior expectations are trimmed at the 1st and 99th percentiles. Standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.4: Inflation Expectations

Horizon	1 year		2 years		6 years	
Experiment 2	0.244	0.188*	0.157	0.026	0.177	0.207
	(0.170)	(0.110)	(0.183)	(0.116)	(0.235)	(0.159)
Experiment 3	0.478***	0.393***	0.372**	0.214*	0.366	0.326**
	(0.171)	(0.111)	(0.184)	(0.117)	(0.236)	(0.159)
Prior		✓		✓		✓
Observations	5,809	5,706	5,759	5,632	5,766	5,673

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

Notes: The table reports OLS regressions of posterior expected inflation at the 1, 2 and 6 year ahead horizon for Experiments 2 and 3.Columns with a check mark in the row labeled Prior additionally control for prior expected taxes at the corresponding horizon. Prior and posterior expectations are trimmed at the 5th and 95th percentiles. Standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.5: Income Expectations

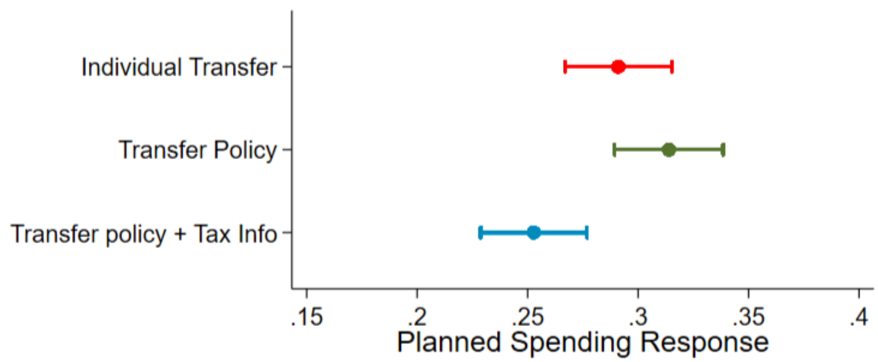
Horizon	1 year		2 years		6 years	
Experiment 2	0.042	0.069	-0.245	0.221	-0.367	-0.013
	(0.308)	(0.234)	(0.308)	(0.208)	(0.397)	(0.293)
Experiment 3	0.567*	0.422*	0.522*	0.428**	-0.119	-0.147
	(0.309)	(0.235)	(0.209)	(0.208)	(0.399)	(0.294)
Prior		✓		✓		✓
Observations	5,706	5,667	5,778	5,667	5,703	5,629

Notes: The table reports OLS regressions of posterior expected income at the 1, 2 and 6 year ahead horizonfor Experiments 2 and 3.Columns with a check mark in the row labeled Prior additionally control for prior expected taxes at the corresponding horizon. Prior and posterior expectations are trimmed at the 1st and 99th percentiles. Standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C.3 Re-weighted Results

We use a post-stratification procedure to construct survey weights that align the joint demographic distribution in our sample with that of the U.S. population. Specifically, we use microdata from the ASEC-CPS, accessed via the IPUMS CPS database (Flood et al., 2023). The CPS sample is restricted to respondents in the March supplement. Population shares are computed using person-level weights provided by CPS. We define demographic cells along three dimensions—age, race, and employment status—which are the primary dimensions. For each cell, we assign a weight equal to the ratio of its population share in the CPS to its share in our survey.

Figure C.2: Average Planned Spending Propensity (Re-Weighted)



Notes: The figure reports the average planned propensity to spend across the three experiments. The planned propensity to spend is computed as the total planned spending divided by the $1,400 transfer amount and aggregated to an annual rate. Each dot represents the average planned spending response in a given experiment, with horizontal lines indicating 99% confidence intervals. These confidence intervals are computed by bootstrap. The results are re-weighted to match the joint distribution of age, race, and employment status in the U.S. population using data from the IPUMS CPS ASEC 2024."Individual Transfer" refers to the individual tax rebate of Experiment 1; "Transfer Policy" presents the universal transfer framed as government policy in Experiment 2; "Transfer Policy + Tax Info" adds information about the potential future tax implications of the policy of Experiment 3.

Figure C.2 presents the average planned propensity to spend across the three experimental treatments after re-weighting the sample to match the joint distribution of age, race, and employment status in the U.S. population. Relative to the unweighted estimates, the re-weighted MPCs are slightly lower in magnitude, though the pattern across experiments remains unchanged. The similarity in relative magnitudes suggests that differences across treatments are not driven by demographic composition, while the modest downward shift in levels reflects the lower average MPCs of groups underrepresented in the survey, such as full-time employed respondents.

The qualitative results for expectations are the same with the reweighted data. Participants in Experiments 1 and 2 continue to report similar expected tax paths, whereas participants in Experiment 3 still anticipate higher future taxes across all horizons.

Table C.6: Tax Expectations (Re-Weighted)

Horizon	1 year		2 years		6 years	
Experiment 2	0.048	0.004	-0.049	0.180	-0.330	0.022
	(0.234)	(0.170)	(0.218)	(0.160)	(0.278)	0.201
Experiment 3	0.714***	0.884***	0.810***	0.976***	0.242	0.369*
	(0.237)	(0.172)	(0.220)	(0.161)	(0.279)	(0.201)
Prior		✓		✓		✓
Observations	5,747	5,680	5,711	5,613	5,730	5,597

Notes: The table reports OLS regressions of posterior expected taxes at each horizon on indicators for Experiments 2 and 3; Experiment 1 is the omitted category. Columns with a check mark in the row Prior additionally control for prior expected taxes at the corresponding horizon. Prior and posterior expectations are trimmed at the 1st and 99th percentiles. The results are re-weighted to match the joint distribution of age, race, and employment status in the U.S. population using data from the IPUMS CPS ASEC 2024. Standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.7: Interest Rate Expectations (Re-Weighted)

Horizon	1 year		2 years		6 years	
Experiment 2	-0.086	-0.159	-0.312*	-0.258**	-0.319	-0.175
	(0.137)	(0.090)	(0.162)	(0.103)	(0.205)	(0.132)
Experiment 3	0.068	-0.024	-0.099	-0.131	-0.268	-0.333**
	(0.137)	(0.091)	(0.162)	(0.103)	(0.206)	(0.133)
Prior		✓		✓		✓
Observations	5,788	5,647	5,793	5,63	5,820	5,696

Notes: The table reports OLS regressions of posterior expected interest rates at the 1, 2 and 6 year ahead horizon for Experiments 2 and 3;. Columns with a check mark in the row labeled Prior additionally control for prior expected taxes at the corresponding horizon. Prior and posterior expectations are trimmed at the 1st and 99th percentiles. The results are re-weighted to match the joint distribution of age, race, and employment status in the U.S. population using data from the IPUMS CPS ASEC 2024. Standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.8: Income Expectations (Re-Weighted)

Horizon	1 year		2 years		6 years	
Experiment 2	0.083	0.003	-0.070	0.253	-0.146	0.169
	(0.278)	(0.211)	(0.287)	(0.191)	(0.370)	(0.267)
Experiment 3	0.560**	0.418*	0.629**	0.595***	0.359	0.269
	(0.280)	(0.213)	(0.289)	(0.192)	(0.371)	(0.268)
Prior		✓		✓		✓
Observations	5,689	5,650	5,761	5,650	5,687	5,613

Notes: The table reports OLS regressions of posterior expected income at the 1, 2 and 6 year ahead horizon for Experiments 2 and 3. Columns with a check mark in the rowlabelled Prior additionally control for prior expected taxes at the corresponding horizon. Prior and posterior expectations are trimmed at the 5th and 95th percentiles. The results are re-weighted to match the joint distribution of age, race, and employment status in the U.S. population using data from the IPUMS CPS ASEC 2024. Standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C.9: Inflation Expectations (Re-Weighted)

Horizon	1 year		2 years		6 years	
Experiment 2	0.223	0.247**	0.146	0.086	0.081	0.160
	(0.158)	(0.100)	(0.174)	(0.107)	(0.222)	(0.145)
Experiment 3	0.332**	0.335***	0.142	0.169	0.074	0.162
	(0.159)	(0.100)	(0.175)	(0.108)	(0.224)	(0.146)
Prior		✓		✓		✓
Observations	5,793	5,691	5,744	5,617	5,752	5,659

Notes: The table reports OLS regressions of posterior expected inflation at the 1, 2 and 6 year ahead horizonfor Experiments 2 and 3. Columns with a check mark in the row labeled Prior additionally control for prior expected taxes at the corresponding horizon. Prior and posterior expectations are trimmed at the 5th and 95th percentiles. The results are re-weighted to match the joint distribution of age, race, and employment status in the U.S. population using data from the IPUMS CPS ASEC 2024. Standard errors are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C.4 Comparing our MPC estimates to the literature

We estimate the cross-sectional averages of marginal propensities to consume (MPCs) using survey responses to hypothetical income gains over four forward-looking intervals: 1–3 months, 3–6 months, 6–9 months, and 9–12 months. This structure allows us to construct both quarterly and annual MPCs, based on total reported household expenditures, including both nondurables and durables. Our main analysis estimates the annual equally-weighted marginal propensity to consume out of an individual transitory transfer. We find a quarterly and annual MPC of 0.16 and 0.32, respectively.

In this appendix section, we compare our results to the estimated MCPs reported in the literature..

Survey-Based Estimates of the MPC There is a large literature on estimating MPCs using survey-based methodologies. Our estimates are close to the range of estimates in the literature. Fuster et al. (2021) estimate a quarterly average MPC that varies between 0.07 and 0.12 for an income gain, depending on the size of the transfer. Colarieti et al. (2024) find a quarterly MPC of 0.16 and an annual MPC of 0.42 for a transfer of $1,000 dollars. Andre et al. (2025) find a 0.35 MPC for a transfer of $1,000. Using SCE data, Koşar et al. (2023) find a quarterly MPC of 0.3.

Christelis et al. (2019) find that the MPC out of an increase in income equal to one-month of household earnings is equal to 0.2 for non-durable goods and 0.19 for durable goods for Dutch households. Using Italian survey data, Jappelli and Pistaferri (2014) find an annual MPC of 0.48 out of a income gain out of a gain equal to one-month of household earnings. Drescher et al. (2020) find MPCs between 0.33 and 0.57 in the Eurozone. Bernard (2023) estimates MPCs that vary between 42% and 54%, depending on shock size and the form in which the transfer is received (cash, savings, or unspecified baseline).

Parker and Souleles (2019) argue that the elicited preference approach to MPC estimation provides similar MPC estimates to the revealed preference approach. Using data from Greece, Kotsogiannis and Sakellaris (2025) estimate a 0.43 annual MPC out of $1,000 tax lottery winnings. Notably, Kotsogiannis and Sakellaris (2025) find that elicited MPCs from survey data closely align with actual decisions measured using administrative data.

Revealed-Preference Estimates of the MPC Our estimates are broadly consistent with recent evidence on consumption responses to income gains. For the 2008 tax rebates, Borusyak et al. (2024) and Orchard et al. (2025) estimate an MPC of approximately 0.30, These estimates are lower than the early estimates reported by Parker et al. (2013) and Broda and Parker (2014). Estimated MPCs based on peoples' response to the 2020 Economic Impact Payments span a wide range: 0.08–0.28 in Parker et al. (2022), 0.25–0.30 in Baker et al. (2023), and roughly 0.40 in Coibion et al. (2020). In a randomized setting, Boehm et al. (2025) report a one-month MPC of 0.23 following an unanticipated €300 transfer. Using high-frequency transaction data, Ganong and Noel (2020) estimate MPCs of 0.21 monthly and 0.29 quarterly for non-durable consumption. Finally, Fagereng et al. (2021) estimate a within-year MPC of approximately 0.50

out of lottery winnings in Norway. Lewis et al. (2024) find an average annual MPC of 0.42 to the 2008 Economic Stimulus Payments.

C.5 Intertemporal marginal propensities to consume

The Euler equation is given by:

$$u'\left(C_0\right) = \beta\left(1+r\right)u'\left(Y_1 - T_1 + R\left(Y_0 - T_0 - C_0\right)\right).$$

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 m_0 and m_1. Differentiating the previous equation with respect to Y_0 yields:

$$u''\left(\overline{C}_0\right)m_0 = \beta\left(1+r\right)^2 u''\left(\overline{C}_1\right)\left\{1 - m_0\right\} \Leftrightarrow m_0 = \frac{\beta\left(1+r\right)^2 u''\left(\overline{C}_1\right)}{u''\left(\overline{C}_0\right) + \beta\left(1+r\right)^2 u''\left(\overline{C}_1\right)}$$

and with respect to Y_1:

$$u''\left(\overline{C}_0\right)m_1 = \beta\left(1+r\right)u''\left(\overline{C}_1\right)\left\{1 - \left(1+r\right)m_1\right\} \Leftrightarrow m_1 = \frac{\beta\left(1+r\right)u''\left(\overline{C}_1\right)}{u''\left(\overline{C}_0\right) + \beta\left(1+r\right)^2 u''\left(\overline{C}_1\right)},$$

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

C.6 Microfoundations of λ

In this section, we present several alternative microfoundations for the cognitive wedge λ. We demonstrate that each modeling approach yields an identical reduced-form representation of the cognitive wedge. The equivalence across these frameworks reflects a common underlying feature: the attenuated response to changes in the economic environment under incomplete information or bounded rationality, relative to the benchmark of fully rational agents operating under full information.

C.6.1 Dispersed-Information and Rational Expectations, and Rational Inattention

We consider a Gaussian and linear-quadratic approximation of the model. First, consumers believe that the aggregate transfer is given by $\varepsilon_0 \sim \mathcal{N}\left(0, \tau_\varepsilon^{-1}\right)$ but their individual transfer is

$$\varepsilon_{i,0} = \varepsilon_0 + \eta_i,$$

where η_i is an i.i.d. normal random variable with mean zero. To first order, individual consumption is given by

$$c_{i,0} = m_0 \cdot \varepsilon_{i,0} - m_1 \cdot \mathbb{E}_0\left[t_1 | s_i\right],$$

where lower case variables are the linearized deviations from a benchmark equilibrium with no transfer and no uncertainty, and $t_1 = \left(1+r\right)\varepsilon_0$. The individual's overall information about the aggregate transfer is summarized by the signal

$$s_i = \varepsilon_0 + \frac{\varsigma_i}{\sqrt{\tau}},$$

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

$$\mathbb{E}_0[t_1|s_i] = (1+r)\,\mathbb{E}_0[\varepsilon_0|s_i] = (1+r)\,\lambda s_i,$$

where $\lambda = \frac{\tau}{\tau_\varepsilon+\tau}$. Peoples' expectations of future taxes are

$$\mathbb{E}_0[t_1|s_i] = \mathbb{E}_0[(1+r)\,\varepsilon_0|s_i] = (1+r)\,\lambda s_i = \lambda t_1 + (1+r)\,\lambda \frac{\varsigma_i}{\sqrt{\tau}}.$$

The economy-wide average expectation is given by

$$\overline{\mathbb{E}_0[t_1]} = \int \mathbb{E}_0[t_1|s_i]\,di = \lambda \cdot t_1.$$

It follows that the response of aggregate demand is given by:

$$\begin{aligned} c_0 &= m_0 \int \varepsilon_{i,0} - m_1 \mathbb{E}_0[t_1|s_i]\,di = (m_0 - m_1(1+r)\,\lambda)\,\varepsilon_0 \\ &= (1-\lambda)\,m_0\varepsilon_0. \end{aligned}$$

We modeled the information sources as exogenous. However, as established in the literature, the optimal signals in a linear-quadratic rational inattention framework would follow the Gaussian structure above (Sims, 2003).

C.6.2 Sticky Information

Following Mankiw and Reis (2002), we assume that each period a fraction λ of individuals become attentive and fully understand the aggregate and fiscal implications of the initial transfer shock. In each period individuals observe their current budget constraint. But they may be inattentive with respect to the future (Carroll et al., 2020; Auclert et al., 2020).

The economy is inhabited by a continuum of identical individuals indexed by $i \in [0,1]$. Each individual spends according to

$$c_{i,0} = m_0\varepsilon_0 - m_1 E_{i,0}[t_1],$$

where $c_{i,0}$ denotes individual consumption and $E_{i,0}[\cdot]$ denotes person i's expectations of their future tax burden. Lower case variables denote each variable's deviation from the equilibrium with $\varepsilon_0 = 0$. Aggregate demand is given by

$$c_t = m_0\varepsilon_0 - m_1 \int_0^1 E_{i,0}[t_1]\,di$$

Under these assumptions, expectations are given by

$$E_{i,0}[t_1] = \begin{cases} 0 & \text{w.prob. } 1-\lambda, \quad \text{(inattentive)} \\ t_1 & \text{w.prob. } \lambda, \quad \text{(attentive).} \end{cases}$$

It follows that the average expectation is given by

$$\overline{E}_0 [t_1] = \lambda t_1$$

and aggregate demand is given by

$$c_0 = m_0 \varepsilon_0 - m_1 \lambda t_1$$

as in the baseline analysis.

C.6.3 Cognitive Discounting

Gabaix (2020) develops a model of cognitive discounting. In this model, agents misperceive the persistence of state variables. In our two-period model, this assumption implies that agents' misperceive the increase in government debt associated with the initial transfer. Let the government budget constraints be

$$B + T_0 = G_0 + \varepsilon_0$$

at time 0 and

$$T_1 = G_1 + (1 + r) B$$

at time 1. Then,

$$\frac{dB}{d\varepsilon_0} = 1 \quad \text{and} \quad \frac{dT_1}{d\varepsilon_0} = (1 + r)$$

denote the increase in government debt associated with the transfer ε_0. Peoples' expectations of the change in government debt due to ε_0 are given by

$$E_0 \left[\frac{dB}{d\varepsilon_0} \right] = \lambda \frac{dB}{d\varepsilon_0},$$

for $\lambda < 1$. It follows that

$$E_0 \left[\frac{dT_1}{d\varepsilon_0} \right] = (1 + r) E_0 \left[\frac{dB}{d\varepsilon_0} \right] = (1 + r) \lambda \frac{dB}{d\varepsilon_0} = \lambda \frac{dT_1}{d\varepsilon_0}.$$

C.6.4 Sparsity/Behavioral Inattention

Let the household's value function be given by:

$$V \equiv \max E_0 [u (C_0) + \beta u (Y_1 - T_1 + (1 + r) (Y_0 - T_0 - C_0))], \tag{C.2}$$

and let V^* denote the value function under FIRE. The following lemma obtains..

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:*

$$\mathbb{L} = \frac{\psi}{2}\mathbb{E}_{-}\left[\left(c_0^* - E_0 c_0^*\right)^2\right], \tag{C.3}$$

where $\psi > 0$ is a constant term.

Proof. Let

$$v\left(C_0\right) = u\left(C_0\right) + \beta u\left(Y_1 - T_1 + (1+r)\left(Y_0 - T_0 - C_0\right)\right)$$

denote the realized utility given the choice C_0. Then, the quadratic approximation around $C_0 = \overline{C}_0$, $\varepsilon_0 = 0$, and $T_1 = \overline{T}_1$ is given by:

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

where $\psi \equiv -u''\left(\overline{C}_0\right) - \beta\left(1+r\right)^2 u''\left(\overline{C}_1\right)$. Note that c_0 solves $\max E_0 v\left(c_0\right)$, so $c_0 = E_0\left[c_0^*\right]$. This fact implies that the realized loss from inattention is given by

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

So

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

□

We model attention following the sparsity model of Gabaix 2014. In this model, person i's beliefs about future taxes are given by:

$$E_0\left[t_1\right] = \lambda t_1,$$

where $\lambda \in [0,1]$ denotes the attention parameter. As $\lambda \to 1$ individual behavior converges to the FIRE benchmark. As $\lambda \to 0$, the person "does not pay attention." The individual chooses the optimal levels of attention to minimize $\mathbb{L} + \mathcal{C}\left(\lambda\right)$, where is given by (C.3). The cognitive cost of attention $\mathcal{C} : [0,1] \to \mathbb{R}_{+}$ is decreasing in λ and continuously differentiable. For simplicity, we assume that $\mathcal{C}\left(\lambda\right) = \kappa\lambda$ for $\kappa \geq 0$ and that the household costlessly observes ε_0. So, as in our survey experiments, respondents have precise information about the current transfer.

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 3. *The losses from inattention are given by*

$$\mathbb{L} = \frac{\psi}{2}\left(1-\lambda\right)^2 m_1^2 \sigma^2, \tag{C.4}$$

and the optimal level of attention is given by

$$\lambda = \max\left\{1 - \frac{\kappa}{\psi m_1^2 \sigma^2}, 0\right\}. \tag{C.5}$$

Consumer i's spending is given by

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

The aggregate MPC out of a government transfer is given by:

$$\mathbb{M} = m_0 (1 - \lambda).$$

C.6.5 General-Equilibrium Inattention

Consider the theory of general-equilibrium inattention, similar to theories of level-k thinking in (García-Schmidt and Woodford, 2019; Farhi and Werning, 2019; Farhi et al., 2020; Bianchi-Vimercati et al., 2024) and shallow thinking as proposed by Mei and Wu (2024). In these theories, people have a limited capacity for causal reasoning about the sequence of general-equilibrium links that connect variables. In particular, in our simple model, the single causal reasoning required is to understand the link between future taxes and current transfers, i.e., people must reason through the government budget constraint to understand that

$$\frac{dT_1}{d\varepsilon_0} = (1 + r).$$

In the spirit of the literature on cognitive uncertainty described above, we model the outcome of this reasoning process as a noisy signal

$$s_i = t_1 + \eta_i, \tag{C.6}$$

where η_i is a Gaussian noise term with variance τ_η^{-1}, and t_1 represents the fully-informed and rational expectation of future taxes. Each individual uses this signal to update their perception of future taxes. Individuals update their beliefs in a Bayesian manner, starting from the prior that t_1 follows a Gaussian process with mean 0 and variance τ^{-1}.

It follows that

$$E_{i,0}[t_1] = \lambda s_i$$

where $\lambda = \frac{\tau_\eta}{\tau + \tau_\eta}$. It follows that individual spending is given by

$$c_{i,0} = m_0 \varepsilon_0 - m_1 \lambda s_i,$$

and aggregate spending is given by

$$C_0 = \int c_{i,0} di = m_0 \varepsilon_0 - m_1 \lambda t_1.$$

C.6.6 Level-k Thinking

Bianchi-Vimercati et al. (2024) develop a model of Ricardian Non-Equivalence based on the level-k thinking model. In particular, they assume that level-0 individuals do not understand the government budget constraint and have policy-invariant expectations of future taxes. Higher cognitive sophistication levels reason through the causal general equilibrium links a finite number of times: level-k individuals reason k times. In our simple model, this implies that all level $k \geq 1$ people immediately understand the increase in future taxes. Spending of a level k individual is given by

$$c_0^k = m_0 \varepsilon_0 - m_1 E_0^k [t_1],$$

where

$$E_0^k [t_1] = \begin{cases} 0 & \text{if } k = 0 \\ t_1 & \text{if } k > 0, \end{cases}$$

denotes the knowledge of future taxes by level-k individual. Aggregate spending is

$$C_0 = \sum_{k=0}^{\infty} \phi_k c_0^k = m_0 \varepsilon_0 - m_1 (1 - \phi_0) t_1,$$

where $\phi_k \geq 0$ denotes the mass of level-k.

C.6.7 Policy Function/Cognitive Uncertainty

Following Ilut and Valchev (2023), we assume that while decision makers fully observe the fundamental shock ε_0, they do not possess a precise mapping from $\varepsilon_0$to their optimal consumption decision (see also Enke and Graeber, 2023; Enke, 2024, for a review). Instead, through deductive reasoning, individuals derive a noisy cognitive signal about their optimal consumption choice. The signal takes the form:

$$s_i = c_0^* + \eta_i, \tag{C.7}$$

where η_i is a Gaussian noise term with variance τ_η^{-1}, and c_0^* represents the fully rational consumption function for individual i. Each individual uses this signal to update their perception of the optimal consumption function. Individuals update their beliefs in a Bayesian manner, starting from the prior that $c_{i,0}^*$ follows a Gaussian process with mean c_0^d and variance τ^{-1}. To fully specify the model, we need to define the prior mean c_0^d. We assume that this prior is given by the individual's observed consumption response to a small idiosyncratic cash transfer. This assumption implies that individuals have prior knowledge of how to respond to familiar and routine financial events. Consequently, this allows us to isolate the specific difficulty of incorporating future tax liabilities into current consumption decisions. Our assumption about the prior mean of c_0^d implies that $c_0^d = m_0 \varepsilon_0$.

Proposition 4. *Suppose that, through deliberation, individuals obtain the signal (C.7) about their optimal consumption function. Furthermore, assume that their prior belief is that c_0^* follows a Gaussian distribution with mean c_0^d and variance τ^{-1}. Under these assumptions, the consumption function for individual i is given by $c_{i,0} = \lambda s_i + (1-\lambda)\, c_0^d$, where the behavioral attenuation parameter is given by $\lambda = \frac{\tau_\eta}{\tau+\tau_\eta} \in (0,1)$.*

Moreover,

$$\begin{aligned} C_0 &= \int c_{i,0} di = \lambda \int s_i di + (1-\lambda)\, m_0 \varepsilon_0 \\ &= \lambda c_0^* + (1-\lambda)\, m_0 \varepsilon_0 = m_0 \varepsilon_0 - m_1 \lambda t_1. \end{aligned}$$

As in the rational inattention case, it is possible to endogeneize the signal s_i allowing agents to choose the optimal precision subject to a cognitive cost. Doing so does not alter the aggregate consumption function derived above.

C.6.8 Limited Planning Horizons

Woodford and Xie (2019, 2022) model a form of Ricardian Non-Equivalence based on the idea that individuals have limited planning horizons. In our simple two-period economy, we model limited planning horizons by assuming that a fraction $1-\lambda$ of individuals only consider the current period and assume that the future remains at steady state. The remaining fraction λ have a full planning horizon.

Let c_0^0 and c_0^* denote the spending profiles of individuals who have limited and full planning horizons, respectively. Then

$$c_0^0 = m_0 \varepsilon_0$$

and

$$c_0^* = m_0 \varepsilon_0 - m_1 t_1.$$

It follows that aggregate spending at time 0 is given by

$$C_0 = (1-\lambda)\, c_0^0 + \lambda c_0^* = m_0 \varepsilon_0 - m_1 \lambda t_1.$$

D Additional Results for Section 4

D.1 Firms

Firms produce the final output according to

$$Y_t = N_t$$

where

$$N_t = \left(\int_0^1 N_{u,t}^{\frac{\mu_w - 1}{\mu_w}} du \right)^{\frac{\mu_w}{\mu_w - 1}}.$$

The standard cost minimization problem is

$$W_t N_t = \min \int_0^1 W_{u,t} N_{u,t} du, \quad s.to \quad N_t = \left(\int_0^1 N_{u,t}^{\frac{\mu_w - 1}{\mu_w}} du \right)^{\frac{\mu_w}{\mu_w - 1}}$$

where $W_{u,t}$ denotes the wage of variety u. The optimality conditions imply that

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

and

$$W_t = \left(\int W_{u,t}^{1-\mu_w} du \right)^{\frac{1}{1-\mu_w}}.$$

Firm profits are $\Pi_t = P_t Y_t - W_t N_t$, which implies that in equilibrium $P_t = W_t$ and so profits are zero. Note that

$$\pi_t = \log \frac{P_t}{P_{t-1}} = \log \frac{W_t}{W_{t-1}} = \pi_t^w,$$

where π_t and π_t^w denote, respectively, goods-prices and wage inflation.

D.2 Wage NKPC

Following the standard approach in the NK literature, we assume each labor type u is supplied by monopolistic labor unions that face nominal wage adjustment costs (e.g., Erceg, Henderson, and Levin, 2000, Schmitt-Grohé and Uribe, 2005, and Auclert et al., 2024b). Unions face the labor demand

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

and demand labor from households. We assume that all households work for every union and as in Auclert et al. (2024b), there is an equal rationing rule which implies that $n_{u,i,t} = N_{u,t}$ for all i, which implies that all households work the same number of hours, i.e. $n_{i,t} = N_t$.

Unions choose wages $W_{u,t}$ on behalf of workers to maximize the discounted value of labor income minus the associated labor supply costs. The union faces Rotemberg wage adjustment costs. For simplicity, these costs are paid in utility units, i.e., workers suffer disutility from wage resets. The problem of the union is given by

$$\sum_{h=0}^{\infty} \beta^h \mathbb{E}_t \left[u'\left(C_t\right)\left(1-\gamma\right)\left(1-\tau_t\right)\left(\frac{W_t}{P_t}N_t\right)^{-\gamma} \frac{W_{u,t}N_{u,t}}{P_t} - v'\left(N_t\right)N_{u,t} - \frac{1}{2\widetilde{\kappa}_w}\left(\frac{W_{u,t}}{W_{u,t-1}}-1\right)^2\right]$$

subject to $N_{u,t} = \left(\frac{W_{u,t}}{W_t}\right)^{-\mu_w} N_t$. As in McKay and Wolf (2022), we assume that unions value the benefit of more income according to the marginal utility $u'\left(C_t\right)$, instead of $\int u'\left(c_{i,t}\right)e_{i,t}di$. This simplifying assumption ensures that the description of the supply block of this economy is the same as the standard RANK model.

The first-order conditions to the union's problem are

$$\left(\frac{W_{u,t}}{W_{u,t-1}}-1\right)\frac{W_{u,t}}{W_{u,t-1}} = \widetilde{\kappa}_w\left[-\left(\mu_w-1\right)u'\left(C_t\right)\left(1-\gamma\right)Z_t\left(\frac{W_{u,t}}{W_t}\right)^{1-\mu_w} + \mu_w v'\left(N_t\right)\left(\frac{W_{u,t}}{W_t}\right)^{-\mu_w}N_t\right] \tag{D.1}$$

$$+\beta\mathbb{E}_t\left(\frac{W_{u,t+1}}{W_{u,t}}-1\right)\frac{W_{u,t+1}}{W_{u,t}}, \tag{D.2}$$

where $Z_t = Y_t - \mathcal{T}_t^Y$. We assume that unions are symmetric, i.e., that $W_{u,-1} = W_{-1}$ for all u. It follows that, in equilibrium, all unions set the same wage $W_{u,t} = W_t$ and $N_{u,t} = N_t$.

In equilibrium, the previous equation simplifies to

$$\pi_t^w\left(1+\pi_t^w\right) = \widetilde{\kappa}_w\mu_w\left[v'\left(N_t\right)N_t - \frac{\mu_w-1}{\mu_w}\left(1-\gamma\right)Z_t u'\left(C_t\right)\right] + \beta\mathbb{E}_t\pi_{t+1}^w\left(1+\pi_{t+1}^w\right).$$

Linearizing this expression around a zero inflation steady state, we obtain that

$$v'\left(N\right)N = \frac{\mu_w-1}{\mu_w}\left(1-\gamma\right)Zu'\left(C\right).$$

The linearized Phillips curve is given by

$$\pi_t^w = \kappa_w\left[\psi^{-1}\cdot\frac{dN_t}{N} + \sigma^{-1}\frac{dC_t}{C} - \left\{\frac{dZ_t}{Z} - \frac{dN_t}{N}\right\}\right] + \beta\mathbb{E}_t\pi_{t+1}^w.$$

D.3 Aggregate demand and savings

Let $y_{i,t} \equiv e_{i,t}Y_t$ denote pre-tax income and $\widetilde{y}_{i,t} = \left(1-\tau_t\right)\left(y_{i,t}\right)^{1-\gamma}$ denote after-tax income. We follow Auclert et al. (2024b) to construct the aggregate demand function.Recall that $Y_t = \frac{W_t}{P_t}N_t = \frac{W_t}{P_t}n_{i,t}$. Household after-tax income is given by

$$\widetilde{y}_{i,t} = (1-\tau_t)(e_{i,t}Y_t)^{1-\gamma} = (1-\tau_t)\,Y_t^{1-\gamma}\mathbb{E}\left[e^{1-\gamma}\right]\theta_{i,t}$$

where and $\mathbb{E}\left[e^{1-\gamma}\right]$ is a constant.

Labor-income tax revenue is given by

$$\mathcal{T}_t^Y = \int_0^1 y_{i,t} - (1-\tau_t)\,y_{i,t}^{1-\gamma}di = Y_t - (1-\tau_t)\,Y_t^{1-\gamma}\mathbb{E}\left[e^{1-\gamma}\right].$$

It follows that $\widetilde{y}_{i,t} = \left(Y_t - \mathcal{T}_t^Y\right)\theta_{i,t}$, where $\theta_{i,t} \equiv \frac{e_{i,t}^{1-\gamma}}{\mathbb{E}[e^{1-\gamma}]}$.

The problem of the household is to maximize utility subject to

$$c_{i,t} + a_{i,t+1} = \left(Y_t - \mathcal{T}_t^Y\right)\cdot\theta_{i,t} + (1+r_t)\,a_{i,t} - T_t.$$

Let

$$c_t^*\left(\theta_i^t, a_{i,0}; \left\{T_s, Y_s - \mathcal{T}_s^Y, r_s\right\}_{s=0}^{\infty}\right), \quad \text{and} \quad a_{t+1}^*\left(\theta_i^t, a_{i,0}; \left\{T_s, Y_s - \mathcal{T}_s^Y, r_s\right\}_{s=0}^{\infty}\right)$$

denote the household's optimal decisions as a function of their history of shocks $\theta_i^t = \{\theta_{i,0}, ..., \theta_{i,t}\}$ and initial savings $a_{i,0}$. We define the aggregate demand function $\mathcal{C}_t$ as follows

$$\mathcal{C}_t\left(\left\{T_s, Y_s - \mathcal{T}_s^Y, r_s\right\}_{s=0}^{\infty}\right) \equiv \int c_t^*\left(\theta^t, a_0; \left\{T_s, Y_s - \mathcal{T}_s^Y, r_s\right\}_{s=0}^{\infty}\right) dD_t\left(\theta^t, a_0\right)$$

where $D_t\left(\theta^t, a_0\right)$ denotes the distribution of individuals over idiosyncratic productivity and initial assets. Analogously, we define the aggregate savings function as

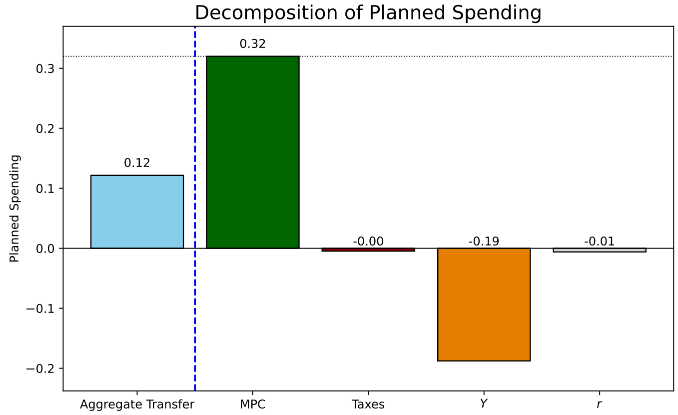
$$\mathcal{A}_t\left(\left\{T_s, Y_s - \mathcal{T}_s^Y, r_s\right\}_{s=0}^{\infty}\right) \equiv \int a_{t+1}^*\left(\theta^t, a_0; \left\{T_s, Y_s - \mathcal{T}_s^Y, r_s\right\}_{s=0}^{\infty}\right) dD_t\left(\theta^t, a_0\right).$$

D.4 Alternative Specifications of Transfer Policy in the HANK Model Under FIRE

D.4.1 Exogenous Windfall or a Reduction in Spending

In the baseline model, we consider the effects of transfer policy that requires future taxation. In this appendix, we consider the case in which the government receives an exogenous source of income that they transfer to households. Note that this transfer does not require an increase future taxation. Figure D.1 shows that this setting produces much smaller planned spending relative to our benchmark case.

Figure D.1: The Marginal Propensity to Spend out of Transfers Financed With Exogenous Income



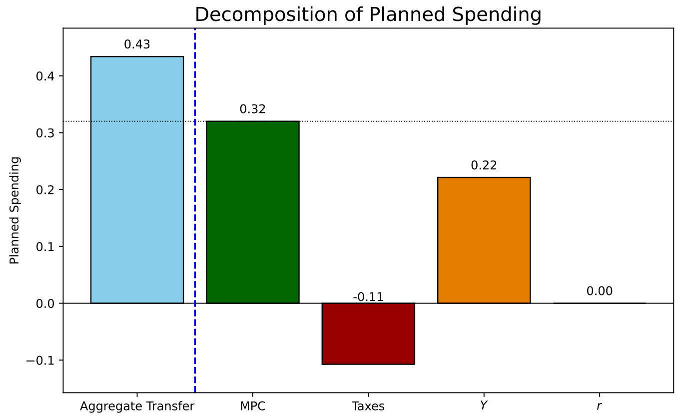
Notes: This figure presents the decomposition of the marginal propensity to spend out of an aggregate transfer under FIRE when the transfer is financed by an exogenous revenue source and does not require future taxation. The bars correspond to the respective components of the analytical expression for $\frac{\partial C_0^{\text{annual}}}{\partial \varepsilon_0}$ derived in equation (4.11). The green bar corresponds to the MPC out of an individual transfer (m_0). The red bar reflects the dampening effect of future lump-sum taxes ($\sum_t m_t \cdot \frac{dT_t}{d\varepsilon_0}$), while the orange bar corresponds to the positive general equilibrium response of income ($\sum_t M_t^Y \cdot dY_t$). The gray bar denotes the effect of changes in real interest rates generated by monetary policy($\sum_t M_t^r \cdot dr_t$). The sum of all components yields the aggregate spending response to the transfer.

D.4.2 Constant real interest rate

In the baseline model, we consider the effects of transfer policy under a standard Taylor rule for monetary policy. In this appendix, we consider the effects of a transfer rule under the assumption that the central bank keeps the real interest rate constant.

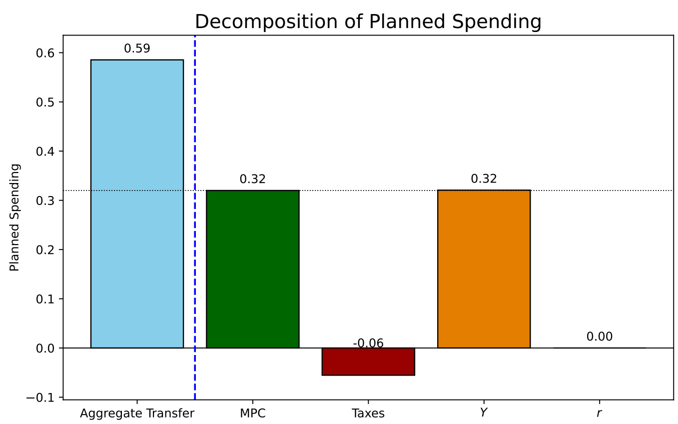
Figures D.2 and D.3 display the propensity to spend out of transfers under a constant real rate for the cases in which the future taxation is lump-sum and distortionary, respectively. They show that , under a constant real rate, the planned spending response of the transfer policy is significantly larger than the underlying marginal propensity to consume.

Figure D.2: The Marginal Propensity to Spend out of Transfers Under FIRE with Constant Real Rate and Lump-Sum Taxes



Notes: This figure presents the decomposition of the marginal propensity to spend out of an aggregate transfer under FIRE with a constant real rate. The bars correspond to the respective components of the analytical expression for $\frac{\partial C_0^{\text{annual}}}{\partial \varepsilon_0}$ derived in equation (4.11). The green bar corresponds to the MPC out of an individual transfer (m_0). The red bar reflects the dampening effect of future lump-sum taxes ($\sum_t m_t \cdot \frac{dT_t}{d\varepsilon_0} + \sum_t M_t^Y \cdot \frac{d\mathcal{T}_t^Y}{d\varepsilon_0}$), while the orange bar corresponds to the positive general equilibrium response of income ($\sum_t M_t^Y \cdot dY_t$). The gray (barely visible) bar denotes the effect of changes in real interest rates generated by monetary policy, ($\sum_t M_t^r \cdot dr_t$). The sum of all components yields the aggregate spending response to the transfer.

Figure D.3: The Marginal Propensity to Spend out of Transfers Under FIRE with Constant Real Rate and Distortionary Taxation



Notes: This figure presents the decomposition of the marginal propensity to spend out of an aggregate transfer under FIRE with contant real reate. The bars correspond to the respective components of the analytical expression for $\frac{\partial C_0^{\text{annual}}}{\partial \varepsilon_0}$ derived in equation (4.11). The green bar corresponds to the MPC out of an individual transfer (m_0). The red bar reflects the dampening effect of future lump-sum taxes ($\sum_t m_t \cdot \frac{dT_t}{d\varepsilon_0}$), while the orange bar corresponds to the positive general equilibrium response of income ($\sum_t M_t^Y \cdot dY_t$). The gray bar (barely visible) denotes the effect of changes in real interest rates generated by monetary policy, ($\sum_t M_t^r \cdot dr_t$). The sum of all components yields the aggregate spending response to the transfer.

D.4.3 Delayed Taxation

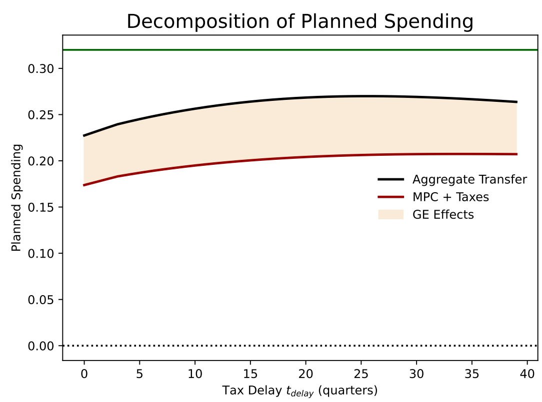
In the baseline model, we consider the effects of transfer policy assuming that debt follows the rule (4.6). This rule implies that taxes are levied starting in period 1. In this section, we consider an alternative in which the government keeps debt at an elevated level for a fixed number of periods before gradually raising taxes. The debt rule we consider is

$$B_{t+1} = (1-\rho_b)\, B_{ss} + \rho_b B_t + \varepsilon_t + (1-\rho_b) \sum_{s=1}^{t_{delay}} \varepsilon_{t-s}. \tag{D.3}$$

Under this alternative tax rule, $\frac{dB_{t+1}}{d\varepsilon_0} = 1$ for $t \leq t_{delay}$ and debt starts to fall after.

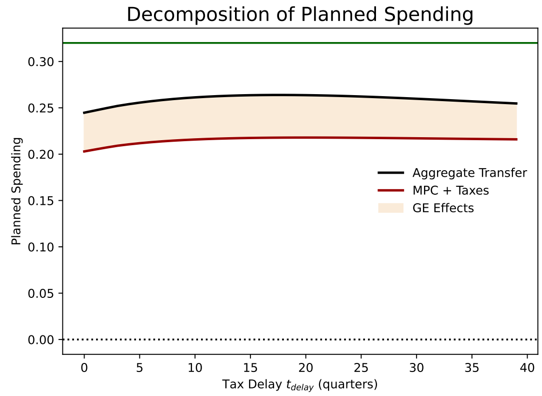
Figures D.4 and D.5 display the propensity to spend out of transfers for different values of t_{delay} for the cases in which the future taxation is lump-sum and distortionary, respectively. These figures show that, delaying the timing at which the government starts to reduce it's level of debt does not render the HANK model consistent with our empirical findings, i.e., the propensity to spend out of transfer remains significantly lower than the MPC for all values of t_{delay} we consider.

Figure D.4: The Marginal Propensity to Spend out of Transfers Under FIRE with Constant Real Rate and Lump-Sum Taxes



Notes: This figure presents the decomposition of the marginal propensity to spend out of an aggregate transfer under FIRE as a function of the delay in taxes t_{delay}, under the tax rule in (D.3) and assuming that transfers are financed with future lump-sum taxation. The black line corresponds to the overall propensity to spend out of transfers. The green line corresponds to the MPC (m_0). The red bar reflects the combined effects of the MPC and the effect of future lump-sum taxes ($m_0 + \sum_t m_t \cdot \frac{dT_t}{d\varepsilon_0} + \sum_t M_t^Y \cdot \frac{d\mathcal{T}_t^Y}{d\varepsilon_0}$), while the orange area corresponds to the combined effect of general-equilibrium effects ($\sum_t M_t^Y \cdot dY_t + \sum_t M_t^r \cdot dr_t$). The sum of all components yields the aggregate spending response to the transfer.

Figure D.5: The Marginal Propensity to Spend out of Transfers Under FIRE with Constant Real Rate and Distortionary Taxation



Notes: This figure presents the decomposition of the marginal propensity to spend out of an aggregate transfer under FIRE as a function of the delay in taxes t_{delay}, under the tax rule in (D.3) and assuming that transfers are financed with future labor-income taxation. The black line corresponds to the overall propensity to spend out of transfers. The green line corresponds to the MPC (m_0). The red bar reflects the combined effects of the MPC and the effect of future lump-sum taxes ($m_0 + \sum_t m_t \cdot \frac{dT_t}{d\varepsilon_0} + \sum_t M_t^Y \cdot \frac{d\mathcal{T}_t^Y}{d\varepsilon_0}$), while the orange area corresponds to the combined effect of general-equilibrium effects ($\sum_t M_t^Y \cdot dY_t + \sum_t M_t^r \cdot dr_t$). The sum of all components yields the aggregate spending response to the transfer.

E Additional Results for Section 5

E.1 Proof of Proposition 2

We assume the representation of aggregate demand in Angeletos et al. (2025). Aggregate demand at time t is a time-invariant function of current and past realizations and expectations:

$$C_t = \mathcal{C}\left(\left\{\left\{T, \mathcal{T}^Y, Y, r\right\}_{h=0}^{\infty}\right\}_{s=-\infty}^{-1}, \left\{\left\{E_s\left[T_{s+h}\right], E_s\left[\mathcal{T}_{s+h}^Y\right], E_s\left[Y_{s+h}\right], E_s\left[r_{s+h}\right]\right\}_{h=0}^{\infty}\right\}_{s=0}^{t}\right) \tag{E.1}$$

$$= \mathcal{C}\left(\left\{\{X\}_{h=0}^{\infty}\right\}_{s=-\infty}^{-1}, \left\{\left\{E_s\left[X_{s+h}\right]\right\}_{h=0}^{\infty}\right\}_{s=0}^{t}\right), \tag{E.2}$$

where (i) $X \equiv \left\{T, \mathcal{T}^Y, Y, r\right\}$, (ii) variables without time subscripts denote their steady state counterparts and (iii) we impose certainty equivalence which is inconsequential for our analysis since we focus on the linearized outcomes.

Define the forecast revision at time τ as $FR_\tau\left[X_{s+h}\right] \equiv E_\tau\left[X_{s+h}\right] - E_{\tau-1}\left[X_{s+h}\right]$. It follows that the aggregate demand function can be written:

$$C_t = \widetilde{\mathcal{C}}_t \left(\left\{ \left\{ E_{-1}\left[X_{s+h}\right] + \sum_{\tau=0}^{s} FR_\tau\left[X_{s+h}\right] \right\}_{h=0}^{\infty} \right\}_{s=0}^{t} \right) \tag{E.3}$$

$$\equiv \mathcal{C}\left(\left\{ \{X\}_{h=0}^{\infty} \right\}_{s=-\infty}^{-1}, \left\{ \left\{ E_{-1}\left[X_{s+h}\right] + \sum_{\tau=0}^{s} FR_\tau\left[X_{s+h}\right] \right\}_{h=0}^{\infty} \right\}_{s=0}^{t} \right). \tag{E.4}$$

Aggregate to the yearly frequency we obtain

$$C_0^{\text{annual}} \equiv \sum_{t=0}^{3} (1+r)^{-t} C_t = \sum_{t=0}^{3} (1+r)^{-t} \widetilde{\mathcal{C}}_t \left(\left\{ \left\{ E_{-1}\left[X_{s+h}\right] + \sum_{\tau=0}^{s} FR_\tau\left[X_{s+h}\right] \right\}_{h=0}^{\infty} \right\}_{s=0}^{t} \right) \tag{E.5}$$

$$\equiv \widetilde{\mathcal{C}}_0^{\text{annual}} \left(\left\{ \left\{ E_{-1}\left[X_{s+h}\right] + \sum_{\tau=0}^{s} FR_\tau\left[X_{s+h}\right] \right\}_{h=0}^{\infty} \right\}_{s=0}^{3} \right) \tag{E.6}$$

Under FIRE, $E_0\left[X_{s+h}\right] = X_{s+h}$ and $FR_\tau\left[X_{s+h}\right] = 0$, and so

$$C_0^{\text{annual, FIRE}} \equiv \widetilde{\mathcal{C}}_0^{\text{annual}} \left(\left\{ \{X_{s+h}\}_{h=0}^{\infty} \right\}_{s=0}^{3} \right).$$

It follows that for any $\hat{X} \in X$,

$$\frac{\partial C_0^{\text{annual, FIRE}}}{\partial \hat{X}_t} = \sum_{s=0}^{3} \frac{\partial \widetilde{\mathcal{C}}_0^{\text{annual}} \left(\left\{ \{E_s\left[X_{s+h}\right]\}_{h=0}^{\infty} \right\}_{s=0}^{3} \right)}{\partial E_s\left[\hat{X}_t\right]}$$

where the derivatives are evaluated around steady state, i.e., $\left\{ \{E_s\left[X_{s+h}\right]\}_{h=0}^{\infty} \right\}_{s=0}^{3} = \left\{ \{X\}_{h=0}^{\infty} \right\}_{s=0}^{3}$.

Finally, differentiating (E.5), we obtain

$$\begin{aligned}
\frac{dC_0^{\text{annual}}}{d\varepsilon_0} &= \sum_{\hat{X}\in X} \sum_{s=0}^{3} \sum_{t=s}^{\infty} \frac{\partial \widetilde{\mathcal{C}}_0^{\text{annual}} \left(\left\{ \{E_s\left[\hat{X}_{s+h}\right]\}_{h=0}^{\infty} \right\}_{s=0}^{t} \right)}{\partial E_s\left[\hat{X}_t\right]} \left\{ \frac{dE_{-1}\left[\hat{X}_t\right]}{d\varepsilon_0} + \sum_{\tau=0}^{s} \frac{dFR_\tau\left[\hat{X}_t\right]}{d\varepsilon_0} \right\} \\
&= \sum_{\hat{X}\in X} \sum_{t=0}^{\infty} \left\{ \sum_{s=0}^{3} \frac{\partial \widetilde{\mathcal{C}}_0^{\text{annual}} \left(\left\{ \{E_s\left[\hat{X}_{s+h}\right]\}_{h=0}^{\infty} \right\}_{s=0}^{t} \right)}{\partial E_s\left[\hat{X}_t\right]} \right\} \frac{dE_{-1}\left[\hat{X}_t\right]}{d\varepsilon_0} \\
&+ \sum_{\hat{X}\in X} \sum_{s=0}^{3} \sum_{t=s}^{\infty} \frac{\partial \widetilde{\mathcal{C}}_0^{\text{annual}} \left(\left\{ \{E_s\left[\hat{X}_{s+h}\right]\}_{h=0}^{\infty} \right\}_{s=0}^{t} \right)}{\partial E_s\left[\hat{X}_t\right]} \sum_{\tau=0}^{s} \frac{dFR_\tau\left[\hat{X}_t\right]}{d\varepsilon_0} \\
&= \sum_{\hat{X}\in X} \sum_{t=0}^{\infty} \frac{\partial C_0^{\text{annual, FIRE}}}{\partial \hat{X}_t} \cdot \frac{dE_{-1}\left[\hat{X}_t\right]}{d\varepsilon_0} + \sum_{\hat{X}\in X} \sum_{s=0}^{3} \sum_{t=s}^{\infty} \frac{\partial \widetilde{\mathcal{C}}_0^{\text{annual}} \left(\left\{ \{E_s\left[\hat{X}_{s+h}\right]\}_{h=0}^{\infty} \right\}_{s=0}^{t} \right)}{\partial E_s\left[\hat{X}_t\right]} \sum_{\tau=0}^{s} \frac{dFR_\tau\left[\hat{X}_t\right]}{d\varepsilon_0}.
\end{aligned}$$

Prior to observing any realized general equilibrium effects of the policy, agents believe

$$\frac{dE_{-1}\left[T_0\right]}{d\varepsilon_0} = -1, \quad \frac{dE_{-1}\left[dX_t\right]}{d\varepsilon_0} = \lambda^{t+1}.$$

Individuals do not expect they they will make forecast errors, so

$$E_{-1}\left[\frac{dFR_\tau\left[\hat{X}_t\right]}{d\varepsilon_0}\right] = 0.$$

It follows that

$$\begin{aligned} E_{-1}\left[\frac{dC_0^{\text{annual}}}{d\varepsilon_0}\right] &= \sum_{\hat{X}\in X}\sum_{t=0}^{\infty}\frac{\partial C_0^{\text{annual, FIRE}}}{\partial \hat{X}_t}\cdot\frac{dE_{-1}\left[\hat{X}_t\right]}{d\varepsilon_0} \\ &= m_0 - \sum_{t=1}^{\infty} m_t\lambda^{t+1}\cdot\frac{dT_t}{d\varepsilon_0} - \sum_{t=1}^{\infty} M_t^Y\lambda^{t+1}\cdot\frac{d\mathcal{T}_t^Y}{d\varepsilon_0} + \sum_{t=0}^{\infty} M_t^Y\lambda^{t+1}\cdot dY_t + \sum_{t=0}^{\infty} M_t^r\lambda^{t+1}\cdot dr_t, \end{aligned}$$

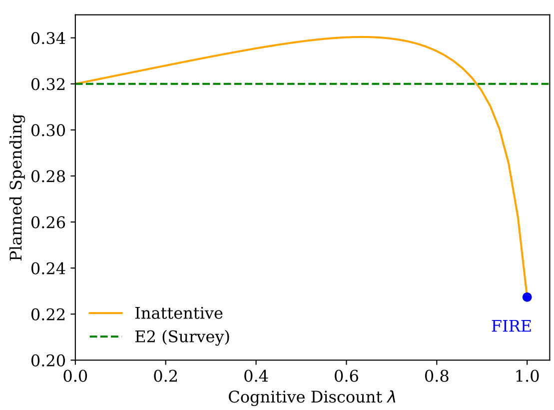
where

$$m_t \equiv -\frac{\partial C_0^{\text{annual, FIRE}}}{\partial T_t}, \quad M_t^Y \equiv \frac{\partial C_0^{\text{annual, FIRE}}}{\partial Y_t}, \quad M_t^r \equiv \frac{\partial C_0^{\text{annual, FIRE}}}{\partial r_t}.$$

E.2 Calibration of λ with Distortionary Labor Taxation

In this appendix, we calibrate λ assuming that transfers are financed by future distortionary labor taxation instead of lump-sum taxes. We show that this leaves the calibration of λ essentially unchanged.

Figure E.1: Planned Propensity to Spend out of Transfers with Inattention and Labor-Income Taxation



Notes: The figure displays the calibrated relationship between the cognitive discount factor λ and the planned propensity to spend out of a transfer. The dashed green line denotes the empirical target from the survey (0.32), and the solid orange line the model-implied spending for different values of λ.

We calibrate λ to match the empirical finding that the planned propensity to spend is equal to the marginal propensity to consume of 0.32. This clalibration yields $\lambda = 0.898$, implying that one-year-ahead expectations are discounted by approximately 35% relative to the FIRE benchmark.

E.3 Experiment 3 in the HANK Model

In this section, we replicate Experiment 3 in our quantitative HANK model under FIRE. As in Experiment 2, the baseline specification fails to generate the large planned spending responses out of transfers observed in the data. We then show that a calibrated version of the model with cognitive discounting can reconcile the theory with the empirical pattern. Moreover, the implied degree of cognitive discounting is very similar to the baseline calibration that targets the results from Experiment 2. In this experiment E3, we interpret inattention to mean that people have difficulty incorporating information about future taxes into their current spending plans, even if that information is readily available. This interpretation is consistent with models of cognitive uncertainty (see Appendix Section C.6.7).

As in E2, households receive a lump-sum transfer in period 0. Unlike E2, those lump-sum transfers are financed with lump-sum taxes in the next year:

$$dT_0 = -\varepsilon_0, \quad \text{and} \quad dT_t = \frac{\varepsilon_0}{4}, \quad t \in \{4, 5, 6, 7\}.$$

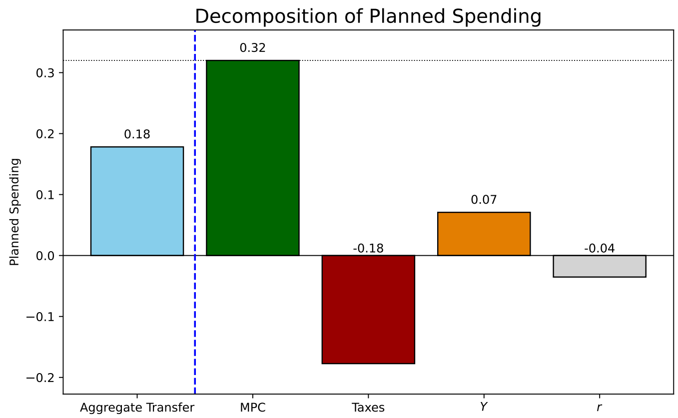
Outside of these lump-sum adjustments, the government adjusts distortionary taxes endogenously to satisfy its budget constraint. So, the key difference between E2 and E3 is the timing of taxes.

Figure E.2 reports the planned propensity to spend out of transfers for the policy experiment that replicates Experiment 3 in our HANK model. In this environment, households are fully informed about, and fully responsive to, the tax increases scheduled for the following year. Relative to the baseline experiment—where government debt is highly persistent and the associated tax adjustments lie far in the future—the tax increases now occur substantially earlier. This shift in the timing of the fiscal adjustment exerts pronounced downward pressure on spending, and the implied planned propensity to spend out of transfers falls to 0.18.

Qualitatively, these results are consistent with the decline in planned spending between Experiments 2 and 3 observed in our empirical evidence in Figure 3.2. Nevertheless, the HANK model under FIRE continues to understate the increase in spending upon receipt of transfers. As before, the low level of the planned spending response is primarily driven by the strong negative effect of anticipated future taxes on current consumption behavior.

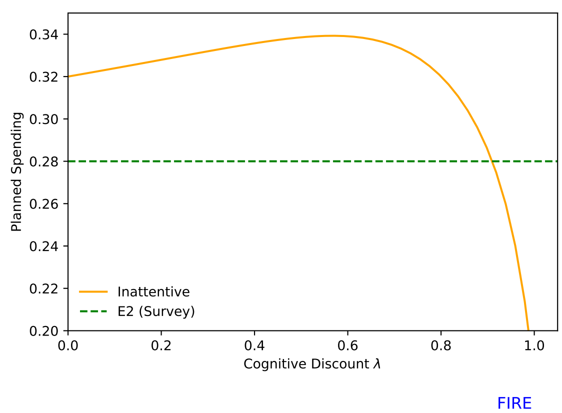
Figure E.3 plots the planned spending response to an aggregate transfer as a function of the cognitive discounting parameter λ. In this experiment, we continue to assume that future taxation takes the form of lump-sum taxes. We calibrate λ to match the empirical estimate that the planned propensity to spend in Experiment 3 equals 0.28. This procedure yields $\lambda = 0.91$, which is essentially identical to our baseline estimate of $\lambda = 0.89$. We infer that our baseline calibration is robust to targeting Experiment 3 rather than Experiment 2 in the estimation of λ. Note that the planned propensity to spend in E3 is smaller than in E2. The intuition for this result is that cognitive discounting has a stronger effect when taxes are paid farther in the future. Since in E3 taxes occur in the next year, there is a smaller dampening effect, leading to a smaller planned spending response to transfers.

Figure E.2: Experiment 3: Propensity to Spend out of Transfers under FIRE



Notes: This figure presents the decomposition of the planned propensity to spend out of an aggregate transfer with future taxes as in Experiment 3 under FIRE. The bars correspond to the respective components of the analytical expression for $\frac{\partial C_0^{\text{annual}}}{\partial \varepsilon_0}$ derived in equation (4.11). The green bar corresponds to the MPC out of an individual transfer (m_0). The red bar reflects the dampening effect of future lump-sum taxes ($\sum_t m_t \cdot \frac{dT_t}{d\varepsilon_0}$), while the orange bar corresponds to the positive general equilibrium response of income ($\sum_t M_t^Y \cdot dY_t$). The gray bar denotes the effect of changes in real interest rates generated by monetary policy, ($\sum_t M_t^r \cdot dr_t$). The sum of all components yields the aggregate spending response to the transfer.

Figure E.3: Experiment 3: *Planned* Propensity to Spend out of Transfers under Inattention



Notes: The figure shows the calibrated relationship between the cognitive discount factor λ and the planned propensity to spend out of a transfer with the policy in Experiment 3. The dashed green line denotes the empirical target from the survey (0.32), and the solid orange line the model-implied spending under varying λ.

F Comparing HANK to Alternatives

F.1 HANK Compared to RANK

In this subsection, we show that the interaction between heterogeneity in marginal propensities to consume and inattention is crucial for generating sizable spending responses to transfers. To make this point transparent, we compare our results to a RANK economy with cognitive discounting in the spirit of Gabaix (2020).

To maintain comparability with our baseline HANK calibration, we restrict attention in the RANK economy to lump-sum taxation, so that inflation is governed by the NKPC

$$\pi_t = \kappa_w y_t + \beta \mathbb{E}_t \left[\pi_{t+1}\right],$$

and we keep the same fiscal and monetary policy rules. In this model, the consumption policy function under cognitive discounting is given by:

$$c_t = (1-\beta)\,\beta^{-1} b_t + (1-\beta) \sum_{s=0}^{\infty} (\beta\lambda)^s \, \mathbb{E}_t \left[y_{t+s} - t_{t+s}\right] - \sigma\beta \sum_{s=0}^{\infty} (\beta\lambda)^s \, \mathbb{E}_t \left[i_{t+s} - \pi_{t+s+1}\right],$$

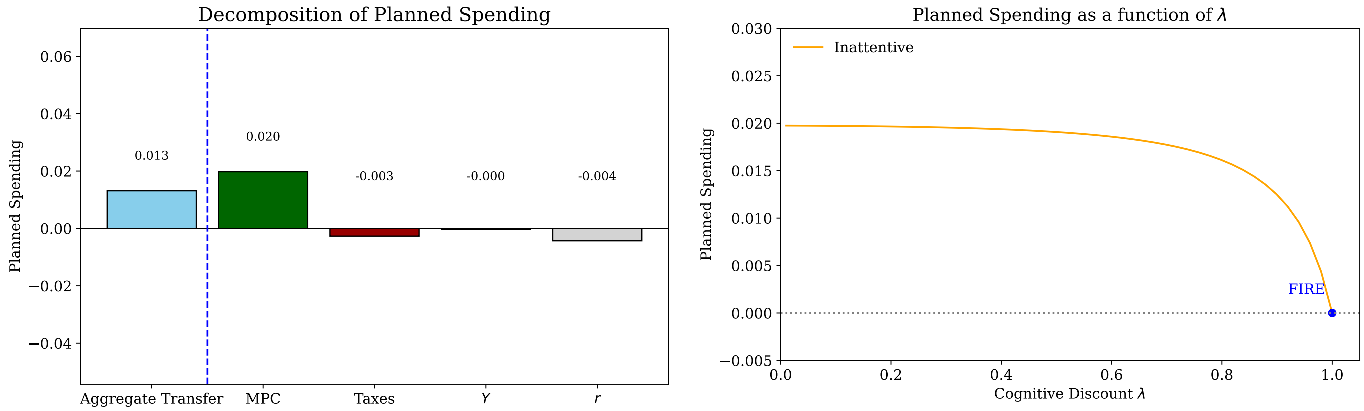
where lower-case variables denote deviations from steady state. Combining this equation with the government budget constraint and the law of motion for debt, we obtain:

$$c_t = \frac{(1-\beta)(1-\lambda)}{1-\beta\lambda\rho_b} \left[\rho_b b_t + \varepsilon_t\right] + (1-\beta) \sum_{s=0}^{\infty} (\beta\lambda)^s \, \mathbb{E}_t \left[y_{t+s}\right] - \sigma\beta \sum_{s=0}^{\infty} (\beta\lambda)^s \, \mathbb{E}_t \left[i_{t+s} - \pi_{t+s+1}\right]. \tag{F.1}$$

Experiment 1 The standard calibration of the RANK model requires setting β to match the steady state real interest rate. In our calibration, we set the annual real interest rate to 2%, which implies that $\beta = 0.995$ for a quarterly model. This implies that the quarterly MPC is $1 - \beta = 0.005$, and the annual MPC is $m_0 = 1 - \beta^4 \approx 0.02$. The calibrated RANK model produces very low MPCs and cannot match our findings for E1.

Experiment 2 Equation F.1 makes the logic of Ricardian (non-)equivalence particularly clear. Under FIRE ($\lambda = 1$), the coefficient on debt and transfers vanishes, and standard Ricardian Equivalence holds. With inattention ($\lambda < 1$), the equilibrium level of consumption depends on the level of debt, because households under forecast future taxes and therefore treat government debt as net wealth. The key term governing the size of this effect is $(1-\beta)(1-\lambda)$: the marginal propensity to consume, $1-\beta$, multiplied by the degree of inattention, $1-\lambda$. This expression reveals the a complementarity between MPCs and Ricardian Non-Equivalence: when agents neglect the future tax implications of transfers, their additional spending is proportional to their MPC. Consequently, the magnitude of the MPC is a key determinant of the RNE multiplier.

Figure F.1: Propensity to Spend out of Transfers in the Inattentive RANK Model



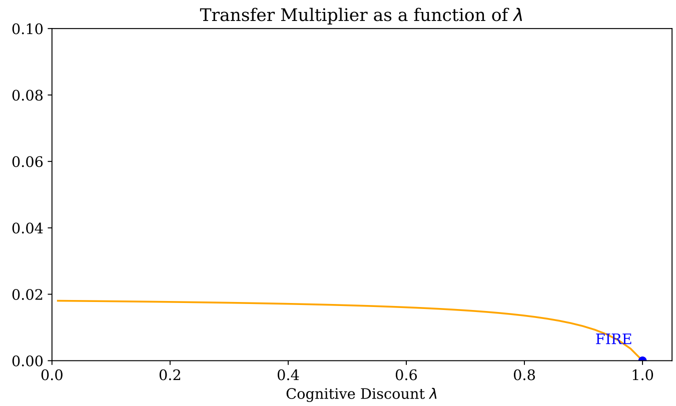
Notes: This figure presents the planned propensity to spend out of an aggregate transfer in the RANK model. The right panel plots the decomposition of the planned spending for our baseline calibration $\lambda = 0.89$. The bars correspond to the respective components of the analytical expression for $\frac{\partial C_0^{\text{annual}}}{\partial \varepsilon_0}$ derived in equation (4.11). The green bar corresponds to the MPC out of an individual transfer (m_0). The red bar reflects the dampening effect of future lump-sum taxes ($\sum_t m_t \cdot \frac{dT_t}{d\varepsilon_0}$), while the orange bar corresponds to the positive general equilibrium response of income ($\sum_t M_t^Y \cdot dY_t$). The gray bar denotes the effect of changes in real interest rates generated by monetary policy ($\sum_t M_t^r \cdot dr_t$). The sum of all components yields the aggregate spending response to the transfer. The left panel plots how the planned spending varies as a function of the parameter of inattention λ. The blue dot corresponds to planned spending under FIRE, and the orange continuous line plots how planned spending varies as a function of the cognitive discounting parameter.

The left panel of Figure F.1 reports the decomposition of planned spending response for our baseline calibration $\lambda = 0.89$.[27] The right panel plots planned spending as a function of λ. Consistent with the discussion above, we find e even with inattention, the propensity to spend out of transfers in the RANK economy is too small relative to what we observe in the micro data. The planned spending response is lower than 0.02 for all levels of inattention λ. In other words, with a representative agent whose MPC is tightly pinned down by β, cannot generate empirically large departures from Ricardian Equivalence. We conclude that a RANK model with inattention cannot account for our empirical findings, and that the combination of high MPCs and inattention in a HANK environment is essential for matching the observed planned spending responses to transfers.

Aggregate consequences of RNE In RANK, the transfer multiplier under FIRE is zero since Ricardian Equivalence holds. With inattention, and the baseline level of inattention $\lambda = 0.89$, the first year transfer multiplier is 0.018. Figure F.2 displays the equilibrium transfer multiplier as a function of the inattention parameter λ. Consistent with the intuition abovethe model generates a very small level of the transfer multiplier for all values of λ.

[27]Note that, under FIRE, spending would always be equal to zero, so instead we illustrate the RANK model with inattention where Ricardian Equivalence fails.

Figure F.2: Transfer Multiplier in the RANK Model



Notes: This figure presents the output multilier of an aggregate transfer in the RANK model as a function of the inattention parameter λ. The blue dot corresponds to the transfer multiplier under FIRE, and the orange continuous line plots the transfer multiplier as a function of λ.

F.2 HANK Compared to TANK

A popular alternative to a HANK model is the TANK model which combines a share of PIH consumers and a share of hand-to-mouth individuals (e.g., Campbell and Mankiw, 1989, and Bilbiie, 2008). To model this alternative, we assume that a share $1-\mu$ of individuals behave according to the PIH

$$c_t^* = (1-\beta)\,\beta^{-1}\frac{b_t}{1-\mu} + (1-\beta)\sum_{s=0}^{\infty}(\beta\lambda)^s\,\mathbb{E}_t\left[y_{t+s} - t_{t+s}\right] - \sigma\beta\sum_{s=0}^{\infty}(\beta\lambda)^s\,\mathbb{E}_t\left[i_{t+s} - \pi_{t+s+1}\right],$$

and a share μ consume

$$c_t^{htm} = y_t - t_t = y_t + \varepsilon_t - \left(\beta^{-1} - \rho_b\right) b_t.$$

The hand-to-mouth consumers consume the entirety of the transfer at time 0, but also lower their future spending in response to higher taxes. These features imply that aggregate demand is

$$y_t = c_t = (1-\mu)\,c_t^* + \mu c_t^{htm}.$$

Experiment 1 In this model, the average first-year MPC is given by

$$m_0 = (1-\mu)\left(1-\beta^4\right) + \mu.$$

It follows that this model is able to generate empirically realistic levels for the marginal propensity to consume. We calibrate β so that the interest rate is 2% annually and calibrate μ to match our E1 finding that that $m_0 = 0.32$. This calibration implies $\beta = 0.995$ and $\mu = 0.3064$. However, as shown in Auclert et al. (2024b), the standard TANK model features patterns of intertemporal MPCs that are inconsistent with salient features of observed spending behavior. To see this result in our model, we define the quarterly iMPCs, $m_t^q = \frac{\partial C_t}{\partial \varepsilon_0}$, which equals the fraction of the initial transfer E1 that individuals consume in each quarter. These quarterly MPCs aggregate to the annual MPC: $m_0 \equiv \sum_{t=0}^{3} \beta^t m_t^q$. It is easy to see that, in this model,

$$m_0^q = (1-\mu)(1-\beta) + \mu, \quad \text{and} \quad m_t^q = (1-\mu)(1-\beta).$$

So, the MPC is high in the first quarter and remains at a constant low level forever after. Figure F.3 displays the quarterly iMPCs in our survey data. Given our calibration above, we find that

$$m_0^q = 0.3098, \quad \text{and} \quad m_t^q = 0.0034.$$

So, on average, people would consume a very large fraction of the transfer in the initial date and a very small fraction of the transfer thereafter. Intuitively, this result reflects the fact that hand-to-mouth consumers spend all of the transfer as soon as they get the transfer. . After the initial date, extra spending arises only from the savings of the PIH consumers, who have very low MPCs. It follows that $m_0 \approx m_0^q$, i.e., the annual MPC mostly materializes in the first period with a residual difference coming from the PIH consumers. As emphasized in Auclert et al. (2024b), this pattern is inconsistent with empirical patterns of iMPCs in the Norwegian lottery data. The same pattern of responses arises in our survey evidence. Figure F.3 shows the pattern of iMPCs in Experiment 1 of our survey. Note that this pattern of iMPCs is inconsistent with the TANK model, but is consistent with our baseline HANK model.

Experiment 2 In this section, we show that the TANK model under FIRE cannot account for the E2-based empirical findings. Using the rule for debt and taxes, we can write the consumption plan of PIH people as

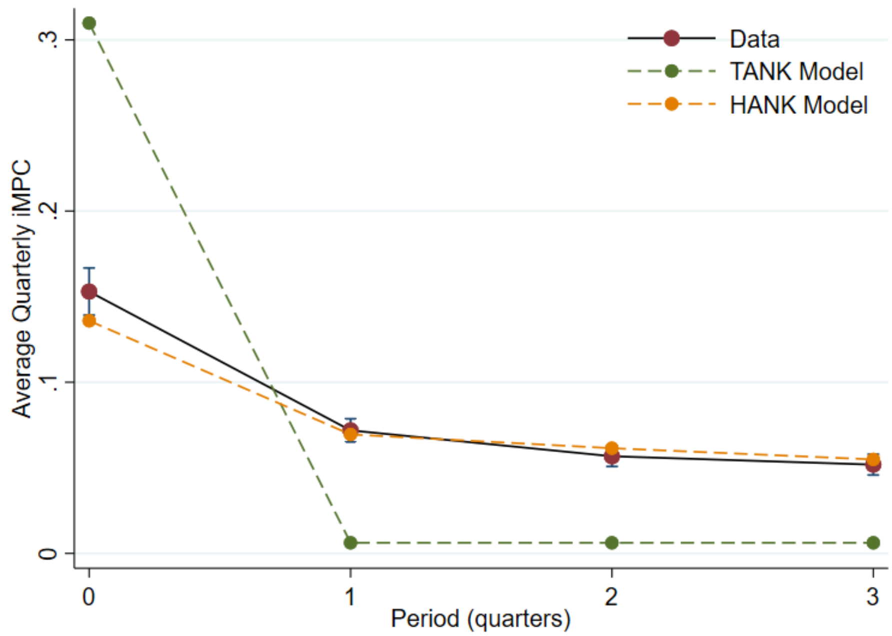
$$c_t^* = (1-\beta)\beta^{-1}\frac{\mu}{1-\mu}b_t + \frac{(1-\beta)(1-\lambda)}{1-\beta\lambda\rho_b}[\rho_B b_t + \varepsilon_t] + (1-\beta)\sum_{s=0}^{\infty}(\beta\lambda)^s \mathbb{E}_t[y_{t+s}] - \sigma\beta\sum_{s=0}^{\infty}(\beta\lambda)^s \mathbb{E}_t[i_{t+s} - \pi_{t+s+1}].$$

Relative to a RANK model under FIRE, we see two additions. First, the term $\frac{(1-\beta)(1-\lambda)}{1-\beta\lambda\rho_B}[\rho_B b_t + \varepsilon_t]$ captures the RNE spending amplification effect. The additional term $(1-\beta)\beta^{-1}\frac{\mu}{1-\mu}b_t$ reflects the fact that PIH consumers will only pay a fraction $1-\mu$ of the future taxes triggered by the transfers. Combining this expression with the consumption rule of the hand-to-mouth consumers, we can show that aggregate demand is given by

$$c_t = -\mu b_{t-1} + \left\{(1-\mu)\frac{(1-\beta)(1-\lambda)}{1-\beta\lambda\rho_b} + \mu\right\}(\rho_b b_{t-1} + \varepsilon_t) + \mu y_t$$
$$+ (1-\mu)(1-\beta)\sum_{s=0}^{\infty}(\beta\lambda)^s \mathbb{E}_t[y_{t+s}] - (1-\mu)\sigma\beta\sum_{s=0}^{\infty}(\beta\lambda)^s \mathbb{E}_t[i_{t+s} - \pi_{t+s+1}]$$

The previous expression differs, in four ways, from the rule for aggregate demand in the RANK model under FIRE. First, the response of aggregate demand to changes in future income, y_{t+s} for $s \geq 1$, and in-

Figure F.3: Quarterly iMPCs in TANK, HANK, and Data



Notes: This figure displays the quarterly iMPCs in our survey evidence (Data) and those implied by the calibrated HANK model and the calibrated TANK model out of the 1,400 dollar individual transfer in Experiment 1. The quarterly iMPCs are the fraction of the transfer that individuals spend in the first, second, third, and fourth quarters, respectively. Values above the 99th percentile are set equal to the 99th-percentile value for each experiment and quarter.

terest rates is dampened by a factor $1-\mu$, since only the PIH consumers respond to future income and interest rates. Second, the MPC out of contemporaneous income, $\mu + (1-\mu)(1-\beta)$, is a weighted average of the MPC of PIH and hand-to-mouth consumers. Third, the response to time t transfers has two components: (i) the RNE term coming from forward-looking behavior of PIH consumers $(1-\mu)\frac{(1-\beta)(1-\lambda)}{1-\beta\lambda\rho_b}\varepsilon_t$, and (ii) the consumption of the entire transfer by the hand-to-mouth consumers $\mu\varepsilon_t$. Fourth, the response to debt inherited before time t has two components: (i) the RNE term coming from forward looking behavior of PIH consumers $(1-\mu)\frac{(1-\beta)(1-\lambda)}{1-\beta\lambda\rho_b}\rho_b b_t$, and (ii) the decline in consumption of the hand-to-mouth consumers arising from the fact that the government levies taxes to pay back a fraction of it's legacy debt $-\mu(1-\rho_b)b_t$.

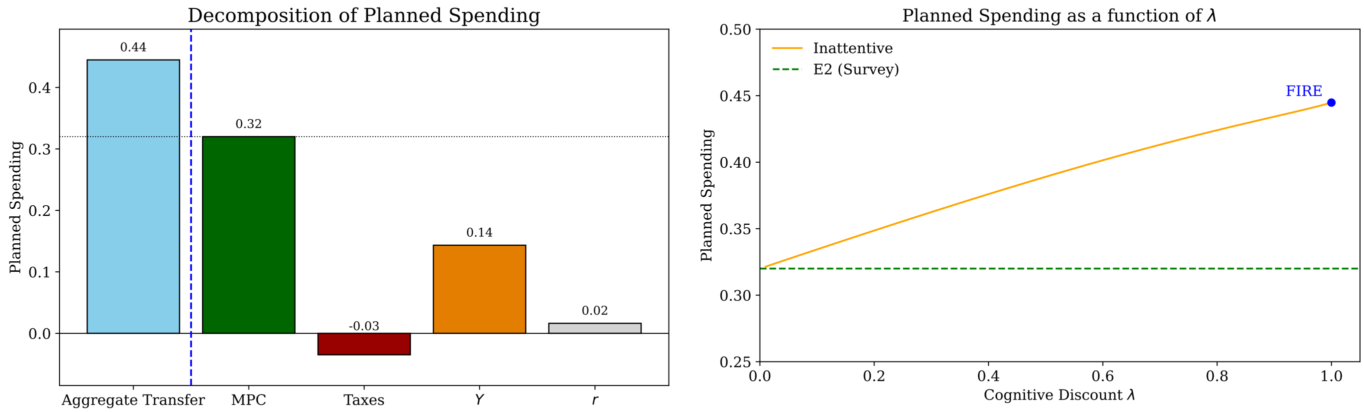
The left panel of Figure F.4 presents a decomposition of the planned spending response within the TANK model under the FIRE assumption. The model predicts a first-year spending response of 0.44, substantially exceeding the empirical estimate reported in E2. In contrast to our baseline HANK specification, the TANK model under FIRE exhibits the opposite qualitative deviation: the response is excessively strong rather than attenuated relative to the underlying MPC. This outcome reflects the facts that response of aggregate consumption is predominantly driven by hand-to-mouth households whose initial consumption largely insensitive to delayed taxes.

The right panel of Figure illustrates how planned spending varies with the degree of inattention, parameterized by λ. As λ declines—implying greater inattention—planned spending correspondingly decreases. This decline is primarily attributable to the diminished foresight of hand-to-mouth consumers, who fail to anticipate the subsequent aggregate expansion and therefore reduce their planned expenditures. This effect is increasing in λ. Nevertheless, planned spending remains too high across all values of λ, except in the limiting case of complete inattention ($\lambda = 0$).

This analysis underscores the inability of the TANK framework to rationalize the empirical results in E2, except in the trivial extreme of fully inattentive agents. The intuition aligns with the structure of the model: iMPCs—central to the HANK explanation—are intrinsically muted in the TANK setting due to the strong assumption of widespread hand-to-mouth behavior.

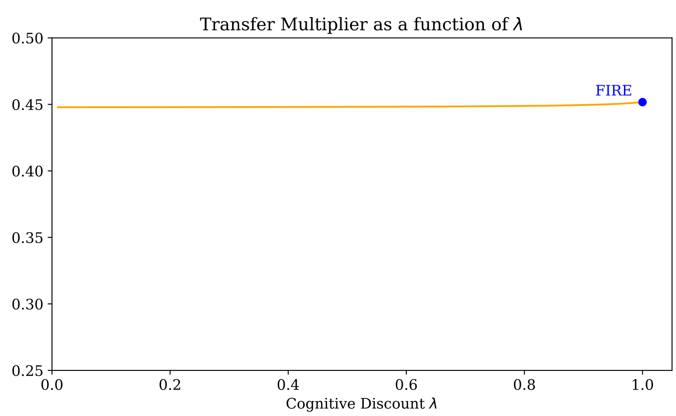
Aggregate consequences of RNE In the TANK model, Ricardian equivalence fails to hold even under the assumption of FIRE. The logic underlying that failure (see the previous section) suggests that the equilibrium transfer multiplier should be relatively insensitive to the degree of inattention in the economy. Figure F.5 corroborates this conjecture.

Figure F.4: Propensity to Spend out of Transfers in the TANK Model



Notes: This figure presents the planned propensity to spend out of an aggregate transfer in the TANK model. The right panel plots the decomposition of the planned spending under FIRE. The bars correspond to the respective components of the analytical expression for $\frac{\partial C_0^{\text{annual}}}{\partial \varepsilon_0}$ derived in equation (4.11). The green bar captures the direct marginal propensity to consume out of an individual transfer (m_0). The red bar reflects the dampening effect of future lump-sum taxes ($\sum_t m_t \cdot \frac{dT_t}{d\varepsilon_0}$), while the orange bar corresponds to the positive general equilibrium response of income ($\sum_t M_t^Y \cdot dY_t$). The gray bar denotes the effect of changes in real interest rates generated by monetary policy ($\sum_t M_t^r \cdot dr_t$). The sum of all components yields the aggregate spending response to the transfer. The left panel plots how the planned spending varies as a function of the parameter of inattention λ. The blue dot corresponds to the planned spending under FIRE, and the orange continuous line plots how the planned spending varies as a function ofλ.

Figure F.5: Transfer Multiplier in the TANK Model



Notes: This figure reports the output multiplier of an aggregate transfer in the TTANK model as a function of the inattention parameter λ. The blue dot corresponds to the transfer multiplier under FIRE, and the orange continuous line plots how the transfer multiplier varies as a function of the cognitive discounting parameter.

G The GE Consequences of Ricardian Non-Equivalence in a Tractable OLG-HANK Model

In this section, we analyze an overlapping generations (OLG) economy populated by perpetual youths who make spending decisions subject to sparsity constraints.[28] Our analysis builds 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:

$$Y_t = N_t. \tag{G.1}$$

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:

$$N_t = \left[\int_0^1 N_{u,t}^{\frac{\theta-1}{\theta}} du \right]^{\frac{\theta}{\theta-1}}. \tag{G.2}$$

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 (G.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

$$N_{u,t} = \left(\frac{W_{u,t}}{W_t} \right)^{-\theta} N_t, \tag{G.3}$$

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

$$\mathcal{U}_{i,t} = E_t \sum_{h=0}^{\infty} (\beta\omega)^h \left[u\left(C_{i,t+h}\right) - v\left(N_{t+h}\right) \right]. \tag{G.4}$$

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.

[28] 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 (see Woodford (1990), Farhi and Werning (2019), and Angeletos et al. (2024a,b)).

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

$$C_{i,t} + A_{i,t+1} = Y_t + \frac{R_t}{\omega} A_{i,t} - T_t + S_{i,t}, \tag{G.5}$$

where $Y_t = \int W_{u,t} N_{u,t} du$.The presence of ω in (G.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., 2024b). 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 (G.3), to maximize households' expected utility. Since all unions are symmetric, they all set the same wage. The linearized wage-NK Phillips curve in this model is given by:

$$\pi_t^w = \kappa_w y_t + \beta \pi_{t+1}^w, \tag{G.6}$$

where $\kappa_w \equiv \widetilde{\kappa}_w \mu_w v'(N) > 0$ 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:

$$i_t = \pi_{t+1}. \tag{G.7}$$

Equivalently, monetary policy keeps the real interest rate constant

$$r_t = 0, \tag{G.8}$$

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

$$B_{t+1} + T_t = R_t B_t + G, \tag{G.9}$$

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

$$b_{t+1} = \beta^{-1} b_t - t_t. \tag{G.10}$$

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

$$t_0 = -\varepsilon_0, \quad \text{and } t_t = \beta^{-1}\tau_b b_t \quad \text{for } t = 1, 2, ... \tag{G.11}$$

where $t_0 = (T_t - T)/Y$. So, the government transfers ε_0 to all households at the initial date and taxes old households 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:

$$b_t = \rho_b b_{t-1}$$

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,

$$C_t + G = Y_t. \tag{G.12}$$

G.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:

$$c_t^* \left(\{y_{t+h}, t_{t+h}\}_{h=0}^{\infty}, b_t\right) = (1-\beta\omega)\left(\beta^{-1} b_t + \sum_{h=0}^{\infty} (\beta\omega)^h \left[y_{t+h} - t_{t+h}\right]\right). \tag{G.13}$$

The MPC out of current income is given by:

$$m_0 \equiv 1 - \beta\omega \in (0,1). \tag{G.14}$$

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 falls, the MPC out of current income rises.

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

$$y_t^* = \mathbb{M}^* \{(1 - \tau_b) d_t + \varepsilon_t\} = \chi^* \rho_b^t \varepsilon_0, \tag{G.15}$$

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

$$\mathbb{M}^* = \frac{m_0}{1 - m_0} \frac{1 - \omega}{1 - \rho_b} \tag{G.16}$$

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.

G.2 Equilibrium with Inattentive Consumers

We endogenize inattention using the Cognitive Discounting model. People's expectations of future income and taxes are given by

$$E_t [y_{t+h}] = \lambda^h \mathbb{E}_t [y_{t+h}] \quad \text{and} \quad E_t [t_{t+h}] = \lambda^h \mathbb{E}_t [t_{t+h}]$$

and aggregate demand is given by:

$$c_t^* \left(\{y_{t+h}, t_{t+h}\}_{h=0}^{\infty}, b_t \right) = (1 - \beta\omega) \left(\beta^{-1} b_t + y_t - t_t + \sum_{h=1}^{\infty} (\beta\omega)^h \{E_t [y_{t+h}] - E_t [t_{t+h}]\} \right). \tag{G.17}$$

Proposition 5. *Aggregate demand $c_t = \int c_{i,t} di$ is given by:*

$$c_t \left(\{y_{t+h}, t_{t+h}\}_{h=0}^{\infty}, b_t \right) = c_t^* \left(\{y_{t+h}, t_{t+h}\}_{h=0}^{\infty}, b_t \right) + \overbrace{m_0 \sum_{h=1}^{\infty} (\beta\omega)^h \left(1 - \lambda^h\right) t_{t+h}}^{RNE} \underbrace{- m_0 \sum_{h=1}^{\infty} (\beta\omega)^h \left(1 - \lambda^h\right) y_{t+h}}_{GE\ Attenuation} \tag{G.18}$$

where $c_t^* \left(\{y_{t+h}, t_{t+h}\}_{h=0}^{\infty}, b_t \right)$ is given by equation (G.13).

Proposition 5 characterizes the aggregate consumption behavior when individuals are inattentive.

Proposition 6 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 6 (The Transfer Multiplier with sparsity)**.** *Equilibrium output in the sparsity economy is given by*

$$y_t = \mathbb{M} \cdot \rho_b^t \cdot \varepsilon_0, \tag{G.19}$$

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

$$\mathbb{M} = \left(\mathbb{M}^* + \mathbb{M}^{RNE}\right) \cdot \delta^{GE}. \tag{G.20}$$

The transfer multiplier can be decomposed into three terms:

1. The FIRE transfer multiplier, $\mathbb{M}^*$, given by (G.16).
2. The RNE transfer multiplier,
$$\mathbb{M}^{\text{RNE}} \equiv \frac{1-\beta\rho_b}{\beta(1-\rho_b)} \frac{m_0(1-\lambda)}{1-\lambda(1-m_0)} \geq 0. \tag{G.21}$$
3. A GE dampening factor
$$\delta^{\text{GE}} = \frac{1-\rho_b}{1-\lambda\rho_b} \frac{1-(1-m_0)\lambda\rho_b}{1-(1-m_0)\rho_b} \leq 1. \tag{G.22}$$

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**:
$$\mathbb{M}^{\text{RNE}} \in \left[0, \frac{1-\beta\rho_b}{\beta(1-\rho_b)}\right]$$
and is equal to zero if and only if there are no dampening from inattention, $\lambda = 1$.
2. **Dependence on inattention:**
$$\frac{d\mathbb{M}^{\text{RNE}}}{d\lambda} = -\frac{1-\beta\rho_b}{\beta(1-\rho_b)} \frac{m_0^2}{[1-\lambda(1-m_0)]^2} \leq 0.$$

3. **Dependence on the MPC**:

$$\frac{d\mathbb{M}^{\text{RNE}}}{dm_0} = \frac{1-\beta\rho_b}{\beta(1-\rho_b)} \frac{(1-\lambda)^2}{[1-\lambda(1-m_0)]^2} \geq 0.$$

4. **Complementarity between MPC and inattention**:

$$\frac{d^2\mathbb{M}^{\text{RNE}}}{d\lambda dm_0} = \frac{1-\beta\rho_b}{\beta(1-\rho_b)} \frac{-2(1-\lambda)m_0}{[1-\lambda(1-m_0)]^3} \leq 0.$$

Corollary 1 highlights several important properties of the RNE transfer multiplier. First, the magnitude of the transfer multiplier crucially depends on λ, which summarizes the impact of inattention. Second, there are strong complementarities between the MPC and the effect of inattention. 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**:

$$\delta^{\text{GE}} = \frac{1-\rho_b}{1-\lambda\rho_b} \frac{1-(1-m_0)\lambda\rho_b}{1-(1-m_0)\rho_b} \leq 1. \tag{G.23}$$

$$\delta^{\text{GE}} \in \left[\frac{1-\rho_b}{1-(1-m_0)\rho_b}, 1\right]$$

and is equal to 1 if and only if expectations are FIRE.

2. **Dependence on inattention:**

$$\frac{d\delta^{\text{GE}}}{d\lambda} = \frac{1-\rho_b}{1-(1-m_0)\rho_b} \frac{\rho_b m_0}{[1-\lambda\rho_b]^2} \geq 0.$$

3. **Dependence on the MPC**:

$$\frac{d\delta^{\text{GE}}}{dm_0} = -\frac{1-\rho_b}{1-\lambda\rho_b} \frac{\rho_b(1-\lambda)}{[1-(1-m_0)\rho_b]^2} \leq 0.$$

4. **Complementarity between MPC and inattention**:

$$\frac{d^2\delta^{\text{GE}}}{d\lambda dm_0} = \frac{1-\rho_b}{[1-\lambda\rho_b]^2} \frac{\rho_b(1-\rho_b)}{[1-(1-m_0)\rho_b]^2} \geq 0$$

Corollary 2 establishes properties for the GE dampening factor that are similar to the RNE multiplier.

H Survey questionnaire

Bot verification

[Captcha]

Before we begin, please enter your Prolific ID below.

[Text box]

H.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.

H.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]]

H.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]

H.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]]

H.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.

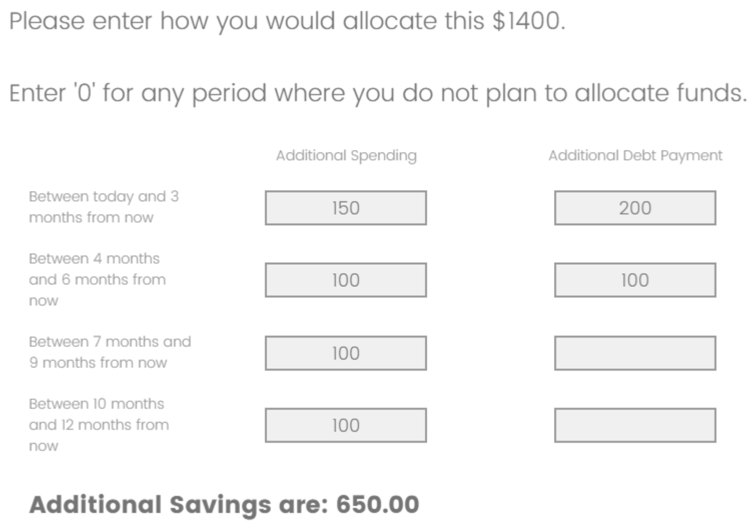
[2. Government Transfer Policy] In this scenario the government sends a one-time unexpected cash transfer of $1,400 to every household in the USA today, including yours. We are interested in understanding how you would use this additional cash.

[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.]


Please enter how you would allocate this $1400.

Enter '0' for any period where you do not plan to allocate funds.

	Additional Spending	Additional Debt Payment
Between today and 3 months from now	150	200
Between 4 months and 6 months from now	100	100
Between 7 months and 9 months from now	100	
Between 10 months and 12 months from now	100	

Additional Savings are: 650.00

H.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]]

H.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]

H.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]]

H.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.