# Perceived Budget Constraint of the Government

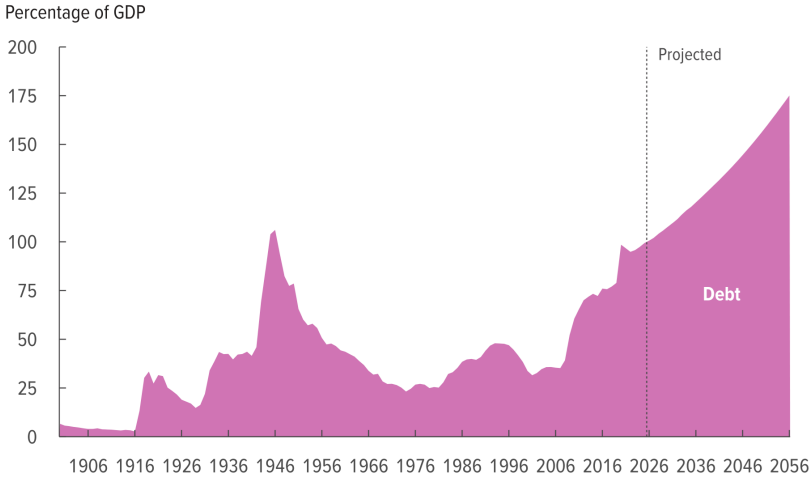
Gabriele Maugeri
Bocconi University

Dmitriy Sergeyev
Bocconi University

IMF – Bocconi University – Banca d'Italia conference
on "Fiscal Policy in an Era of Uncertainty"
and XXIV Banca d'Italia Public Finance Workshop

June 4-5, 2026

# U.S. Federal Debt Held by the Public




Source: The CBO Budget and Economic Outlook: 2026 to 2036 (February, 2026)

# Textbook Government Budget Constraint

Flow budget constraint

$$B_{t-1} = P_t s_t + \frac{1}{1+i_t} B_t$$

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$$\frac{B_{t-1}}{P_{t-1}} = \frac{P_t}{P_{t-1}} \mathbb{E}_t \left[ \sum_{k=0}^{\infty} \frac{s_{t+k}}{\mathcal{R}_{t,t+k}} \right] + \frac{P_t}{P_{t-1}} \mathbb{E}_t \lim_{k \to \infty} \left[ \frac{1}{\mathcal{R}_{t,t+k}} \cdot \frac{1}{1+i_{t+k}} \cdot \frac{B_{t+k}}{P_{t+k}} \right]$$

- where $\mathcal{R}_{t,t+k}$ is the realized real return

CBO deficit forecasts

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CBO deficit forecasts

Debt financing expectations affect

- aggregate demand (households and firms)
- debt sustainability (bond investors)
- political choices (voters in democracies)

# What we do

## Question

- What do **households** think about government debt financing?

## Approach

1. A survey of representative sample of U.S. households (and experts)
2. A New-Keynesian model to evaluate the results

# Related Literature

Government borrowing

- Most of macroeconomics, public finance, political economy
- **This paper:** measurement of beliefs

Historical decomposition of government finances

- Hall and Sargent (1997, 2011)
- **This paper:** future decomposition of government finances

Valuation of government debt

- Reis (2022), Brunnermeier, Merkel, Sannikov (2024), Jiang, Lustig, Van Nieuwerburgh, Xiaolan (2024)
- **This paper:** survey evidence

Survey evidence on how info on government debt affects expectations

- Coibion, Gorodnichenko, Weber (2021); Roth, Settele, Wohlfart (2022); Andrade, Gautier, Mengus, Moench, Schmidt (2025); Bianchi, Dabla-Norris and Khalid (2025)
- **This paper:** sources of financing of government debt

# Extended Government Budget Constraint

# Extended Government Budget Constraint

$$\frac{B_{t-1}}{P_{t-1}}(1-\delta_t) = \Pi_t \left[\tau_t Y_t - G_t + \frac{1}{1+i_t^s}\cdot\frac{B_t}{P_t} + f_t + \frac{M_t - M_{t-1}}{P_t} + \left(\frac{1}{1+i_t} - \frac{1}{1+i_t^s}\right)\frac{B_t}{P_t}\right]$$

Notation

- $\delta_t$ – fraction of defaulted debt
- $f_t$ – proceeds from sale or renting public assets
- $(M_t - M_{t-1})/P_t$ – monetary financing
- $[1/(1+i_t) - 1/(1+i_t^s)]\, B_t/P_t$ – "bubble" (liquidity yield,financial repression,etc.)

where

- $i_t$ – 1-period government bond interest rate
- $i_t^s$ – 1-period interest rate on non-liquid assets
- $\Pi_t$ – gross inflation rate

# Extended Government Budget Constraint

Iterate forward and linearize around $\Pi_t = 1$, $Y_t = Y$, $G_t = G$, $T_t = T$, $i_t = i$, $i_t^s = i^s$

$$\widehat{b}_{t-1} = \widetilde{\mathbb{E}}_t \sum_{k=0}^{\infty} \beta^k \Big[ \underbrace{Y\widehat{\tau}_{t+k}}_{\text{Tax rate}} + \underbrace{Y\tau\widehat{Y}_{t+k}}_{\text{Tax base}} - \underbrace{G\widehat{G}_{t+k}}_{\text{Gov. spending}} \quad \leftarrow \text{Surplus}$$

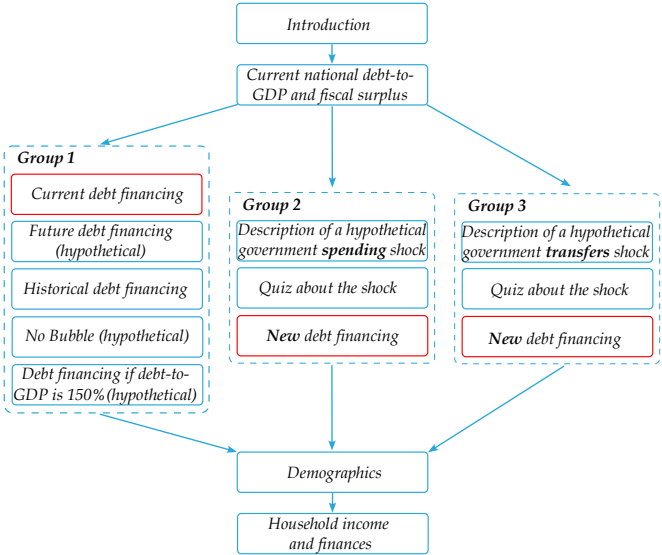
$$+ \underbrace{(b+m)\,\widehat{\pi}_{t+k}}_{\text{Inflation}} + \underbrace{\Delta\widehat{m}_{t+k}}_{\text{Money printing}} - \underbrace{\frac{1}{1+i} b\widehat{i}_{t+k}}_{\text{Nom. interest rate}} \quad \leftarrow \text{Monetary}$$

$$+ \underbrace{\widehat{f}_{t+k}}_{\text{Gov. Assets}} + \underbrace{b\delta_{t+k}}_{\text{Default}} \quad \leftarrow \text{Extreme FP}$$

$$+ \beta \frac{i^s - i}{1+i} \widehat{b}_{t+k} \Big] + \widetilde{\mathbb{E}}_t \lim_{k\to\infty} \beta^k \widehat{b}_{t+k} \quad \leftarrow \text{“Bubble”}$$

where $\beta \equiv 1/(1+i^s)$

# Survey Design




- **Platform**: Prolific
- **Survey period**: May 2025
- **Sample**: 2,783 U.S. h/h
- **Representative along** (1) gender, (2) age, (3) region, (4) education, and (5) household income
- **Median response time** $\approx$ 12.9 minutes

# Current Debt Financing

# Current Debt Financing (Qualitative) Question

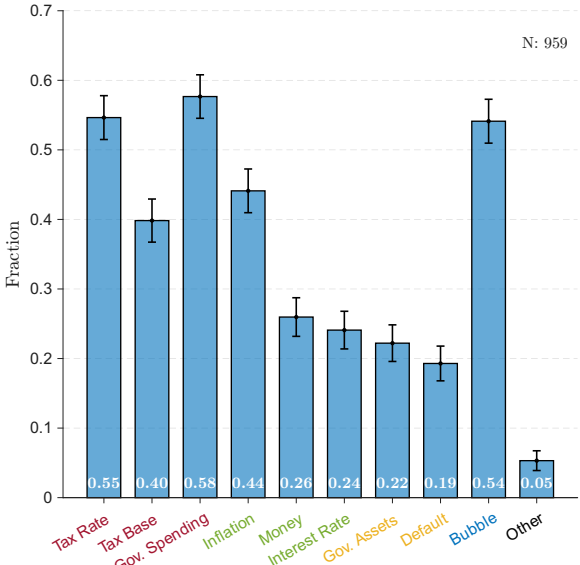
**In your opinion, what will the U.S. government do, both in the near and distant future, to handle its current level of debt?** (Select all options you think apply.)

The government will ...

1. increase tax revenues through higher tax *rates*
2. increase tax revenues thanks to economic growth, which will expand the tax base, without needing to increase tax rates
3. lower government spending (on goods, services, and social programs)
4. allow for inflation, making debt issued today easier to repay with less valuable future dollars
5. print money to repay the debt
6. lower the interest rate on its debt
7. sell government property (like federal buildings, land, or highways)
8. default on part of the debt
9. keep borrowing (rolling over the debt), potentially forever, even without collecting revenues above government spending (on goods, services, and social programs)
10. do something else (please specify)

Qualitative Bubble question | Quantitative question | Quantitative bubble question

# Current Debt Financing: Qualitative Question

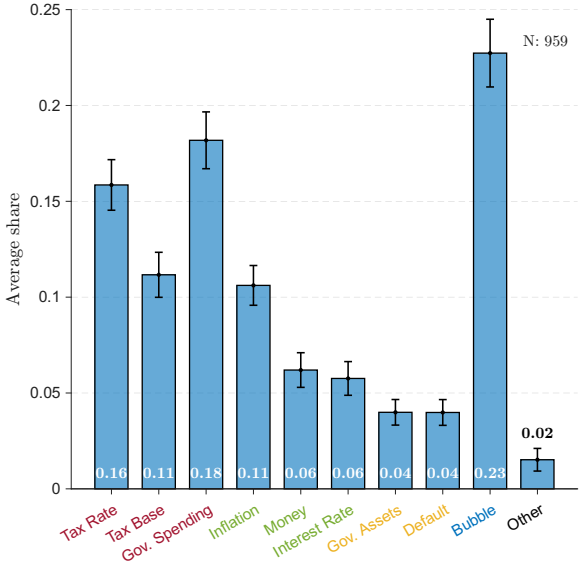



1. Median number of choices: 3 Details

2. **Popular categories**
   - surplus (tax rate,tax base,G)
   - inflation
   - bubble

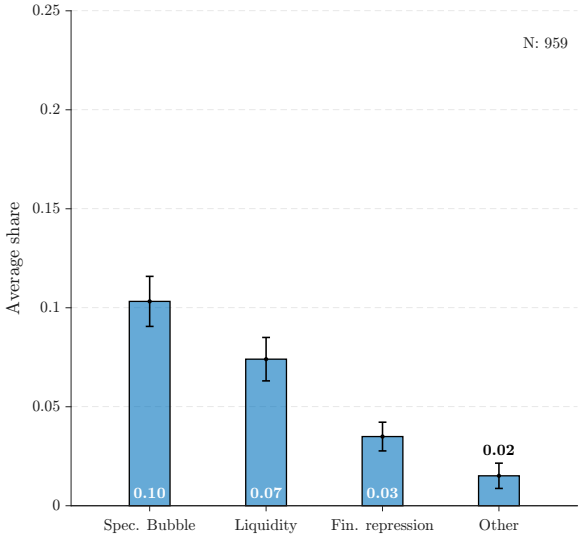
3. **Are the choices equally important?**
   In your opinion, what percentage of the U.S. national debt will be handled by each of the options you selected previously (shown below)? (Please enter percentages below. Your answers should add up to 100%.)

# Current Debt Financing: Quantitative Question




1. **Primary surpluses** (tax rate + tax base + gov. spending) = 45%
2. **Monetary response**
   Inflation = 11%
   Money printing = 6%
   Interest rate = 6%
3. Sale of gov. assets = 4%
   Default = 4%
4. **"Bubble"** = 23%
   "The government will keep borrowing (rolling over the debt), potentially forever, even without collecting revenues above government spending (on goods, services, and social programs)."

# Decomposing the Bubble




1. "Speculative bubble" = 10%
   "Today's government bond investors believe that future investors will keep purchasing government debt."
2. Liquidity services = 7%
   "Government debt is a safe and liquid asset, allowing the government to borrow at lower interest rates than private firms."
3. Financial repression = 3%
   "The government will force private banks to buy its debt, for example, through financial regulation."

# Expert Survey

# Current Debt Financing: Quantitative Question

**Expert survey details**

- April 2026
- 295 academic/policy economists
- Short version of the h/h survey
- Median response time $\approx$ 4 minutes

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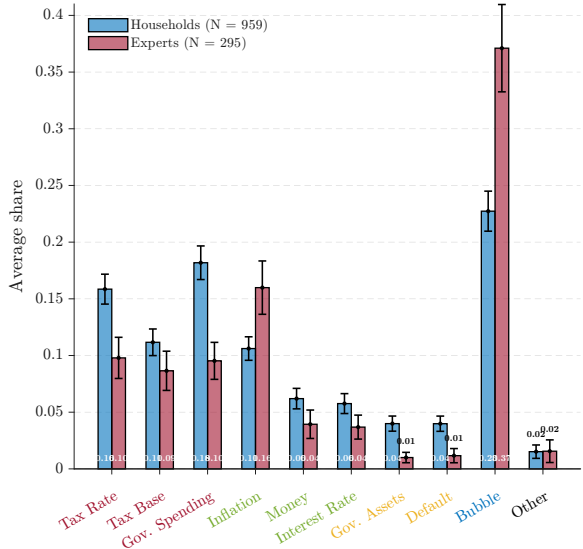
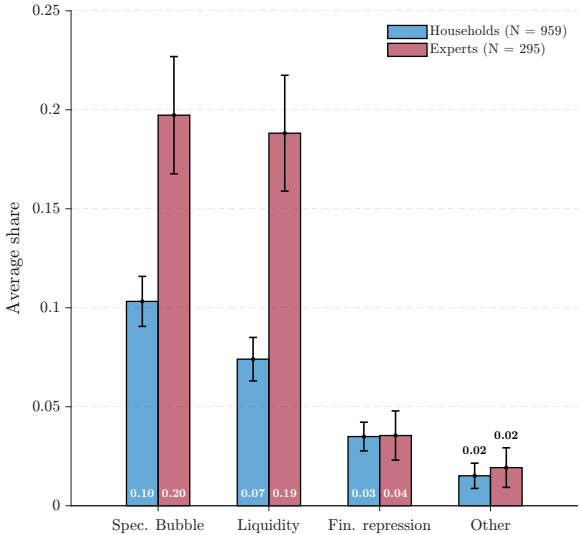
**Observations**

1. Primary surplus: 29% vs. 45%
2. Inflation: 17% vs. 11%
3. "Bubble": 37% vs. 23%



# Decomposing the Bubble




1. Speculative bubble = 20% vs. 10%
   "Today's government bond investors believe that future investors will keep purchasing government debt."
2. Liquidity services = 19% vs. 7%
   "Government debt is a safe and liquid asset, allowing the government to borrow at lower interest rates than private firms."
3. Financial repression = 4% vs. 3%
   "The government will force private banks to buy its debt, for example, through financial regulation."

# More Results on Overall Debt Financing

## Hypothetical/historical/open-ended questions

- **Future debt financing** Results
  - Same level of debt but in 2030 + U.S. economy is not booming or contracting
- **Future debt financing: high debt level** Results
  - 150% debt-to-GDP in 2030 + U.S. economy is not booming or contracting
- **No "bubble" debt financing** Results
  - U.S. cannot roll-over its debt without collecting revenues in excess of spending
- **Historical debt financing** Results
  - "How in your view the U.S. federal government handled its debt in the past?"
- **Open-ended bubble question**
  - of those who chose "bubble," 62% provide explanation resembling bubble narratives

## Heterogeneity

- Respondents observable characteristics explain only 5% of current debt financing
- Significant correlates: education, children, political preferences, employment status

Correlates Total variation

# Debt Financing after Shocks (Hypothetical Questions)

# Debt Financing after Fiscal Shocks

## Shocks

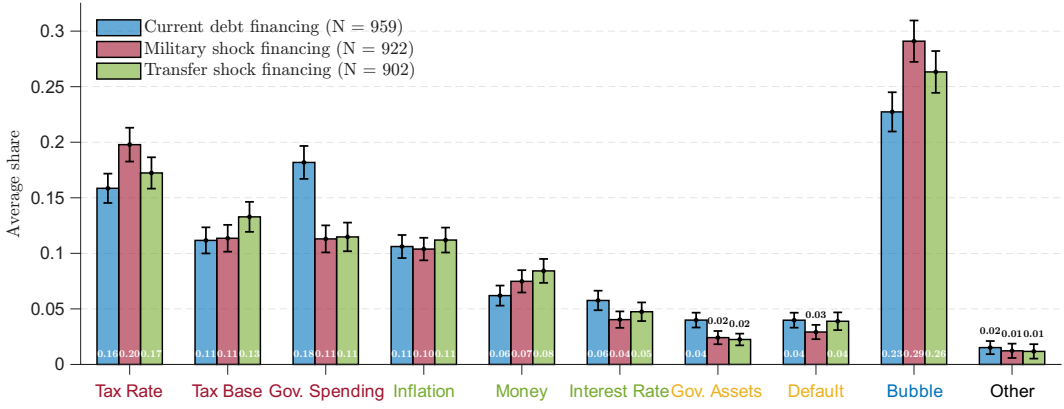
- **Government military purchases shock** (most studied and identified G shock)
- **Uniform cash transfers to households** (salient and perhaps less emotionally charged)

## Details

- **Size**: 10% of GDP
- **Duration**: one year
- **Other spending**: no changes
- **Financing**: debt-financed during the first year
- **Rationale**: exogenous
- **Expectations**: unexpected

G shock | G shock Quiz | G shock Quiz Results | Tr shock | Tr shock Quiz | Tr shock Quiz Results

# Fiscal Shocks Financing




1. Fiscal shocks financing is perceived in the same way
2. Both shocks shift financing toward bubble and away from gov. spending

Individual taxes

# So what?

# New-Keynesian Model with Debt in Utility Function

Representative household with rational expectations

- **chooses** consumption/labor/prices for its firm/government and private bonds
- **likes** money and government bonds, **dislikes** changing prices a la Rotemberg

Fiscal authority

- **spends** $\widetilde{g}_t = \mu_y \widehat{y}_t + \varepsilon_t^g$
- **collects** lump sum taxes $\widetilde{\tau}_t = \psi_b \widetilde{b}_{t-1} + \varepsilon_t^T$
- **rents** government property $\widetilde{f}_t = \vartheta_b \widetilde{b}_{t-1}$

Monetary authority

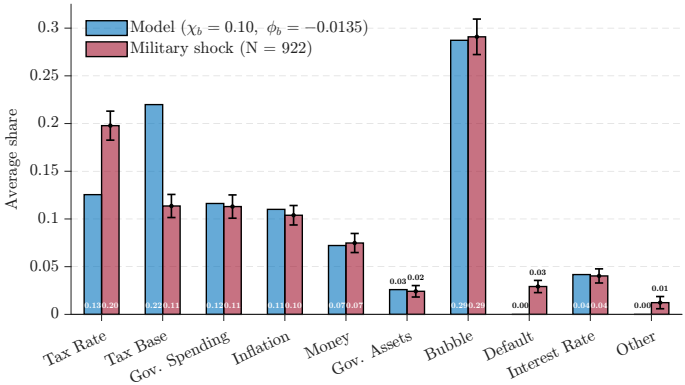
- **sets** interest rate on gov. bonds according to the Taylor rule: $i_t = \phi_\pi \pi_t + \phi_b s_b^{-1} \widetilde{b}_t$
- **supplies** money to satisfy money demand

Shocks

- **Military spending**: $\{\varepsilon_t^G\}_{t=0}^{\infty} = \{\mathbf{0.1}, \mathbf{0.1}, \mathbf{0.1}, \mathbf{0.1}, 0, 0, ...\}$
- **Cash transfer**: $\{\varepsilon_t^T\}_{t=0}^{\infty} = \{\mathbf{-0.1}, \mathbf{-0.1}, \mathbf{-0.1}, \mathbf{-0.1}, 0, 0, ...\}$

Household problem details

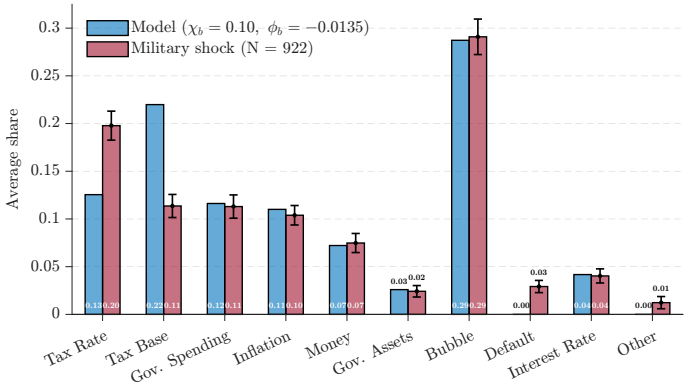
# Model Calibration




**Target**: debt financing shares after a military spending shock

Other parameters

# Model Calibration

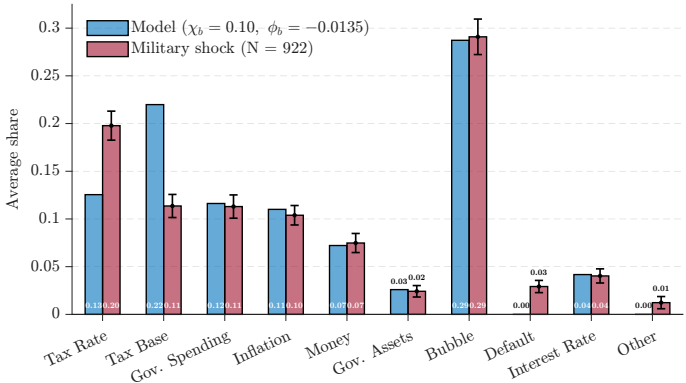



**Target**: debt financing shares after a military spending shock

Other parameters

**A Taylor rule**:
$i_t = 1.5 \cdot \pi_t - 0.0135 \cdot \widetilde{b}_t$
**Counter-cyclical spending**:
$\widetilde{g}_t = -0.1 \cdot \widehat{y}_t + \varepsilon_t^g$
**Tax revenues react to debt**:
$\widetilde{\tau}_t = 0.03 \cdot \widetilde{b}_{t-1} + \varepsilon_t^\tau$

# Model Calibration

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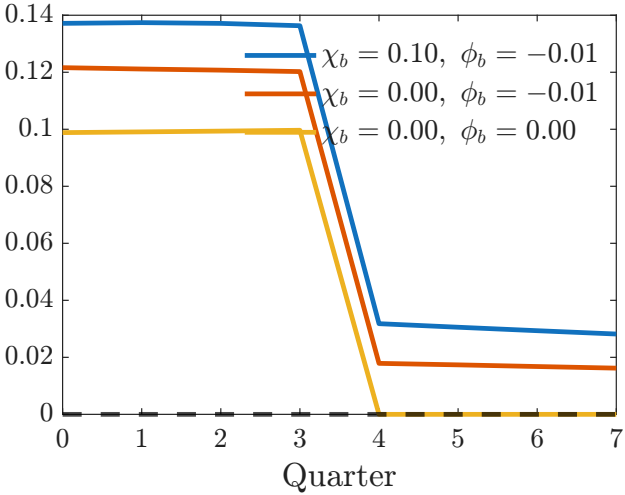
**Tax revenues react to debt**:
$\widetilde{\tau}_t = 0.03 \cdot \widetilde{b}_{t-1} + \varepsilon_t^\tau$

**Subjective discount factor** (annualized): $\beta^A = 0.9$
$\Rightarrow$ Spread between non-government assets and gov. bonds: 8% (annual)

- Similar to $m - r$ in Ricardo Reis' "$r < g < m$" paper

# Output Impulse Responses




**The debt-sensitive Taylor rule** increases the fiscal multiplier by 20 percentage points

**"Bubble"** increases the fiscal multiplier by another 17 percentage points

# Conclusion

1. Survey evidence on public debt financing expectations of households

   - Primary surplus is expected to finance about 1/2 of debt
   - "Bubble" is expected to finance about 1/4 of debt
   - Inflation is expected to finance about 1/10 of debt

2. Experts

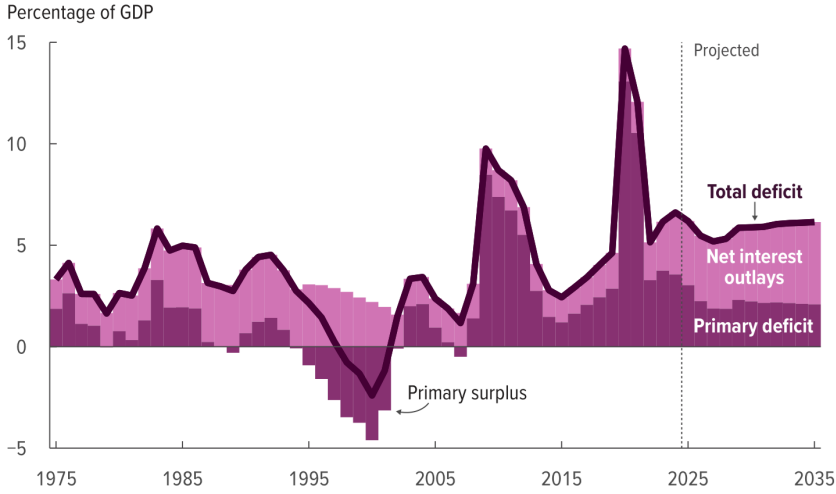
   - put lower weight on surpluses, and higher weights on "bubble" and inflation

3. Model

   - "Bubble" and debt-sensitive Taylor rule significantly alters macro dynamics

# Extra Slides

# U.S. Federal Government Deficit




Source: The CBO Budget and Economic Outlook: 2025 to 2035 (January, 2025)

# Qualitative Bubble Questions

In the previous question, you chose that

"*The government will keep borrowing (rolling over the debt), potentially forever, even without collecting revenues above government spending (on goods, services, and social programs)*"

**Which of the following reasons do you think would allow the government to continue borrowing in this situation?** (Pick all that apply)

1. Today's government bond investors believe that future investors will keep purchasing government debt
2. Government debt is a safe and liquid asset, allowing the government to borrow at lower interest rates than private firms
3. The government will force private banks to buy its debt, for example, through financial regulation
4. Something else (please specify)

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# Quantitative Questions

**In your opinion, what percentage of the U.S. national debt will be handled by each of the options you selected previously (shown below)?** (Please enter percentages below. Your answers should add up to 100%.)
[ONLY PREVIOUSLY SELECTED ANSWERS ARE SHOWN]

1. increase tax revenues through higher tax *rates*: _____
2. increase tax revenues thanks to economic growth, which will expand the tax base, without needing to increase tax rates: _____
3. lower government spending (on goods, services, and social programs): _____
4. allow for inflation, making debt issued today easier to repay with less valuable future dollars: _____
5. print money to repay the debt: _____
6. lower the interest rate on its debt: _____
7. sell government property (like federal buildings, land, or highways): _____
8. default on part of the debt: _____
9. keep borrowing (rolling over the debt), potentially forever, even without collecting revenues above government spending (on goods, services, and social programs): _____
10. do something else (please specify): _____

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# Quantitative Bubble Questions

In the previous question, you answered that X% of government debt will be rolled over potentially forever.

Please allocate this X% across the options you selected earlier (listed below), in any proportions you think are appropriate. (Please enter percentages below. Your answers should add up to X%.)

[ONLY PREVIOUSLY SELECTED ANSWERS ARE SHOWN]

1. Today's government bond investors believe that future investors will keep purchasing government debt: _____
2. Government debt is a safe and liquid asset, allowing the government to borrow at lower interest rates than private firms: _____
3. The government will force private banks to buy its debt, for example, through financial regulation: _____
4. Something else (please specify): _____

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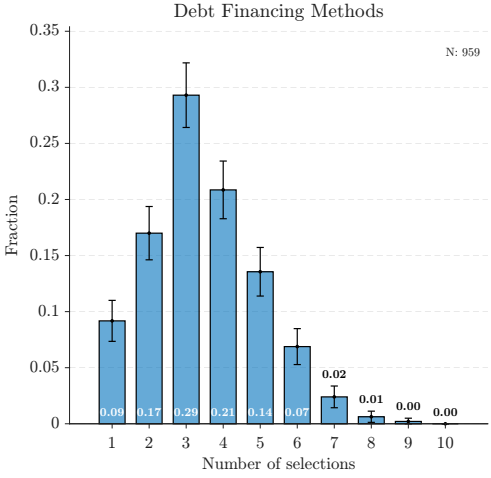
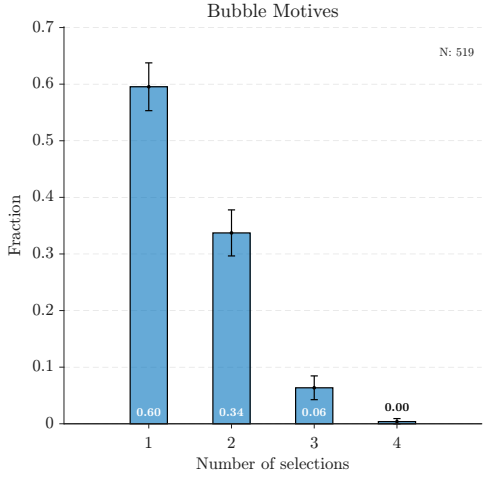
# Current Debt Financing: # of Selected Answers

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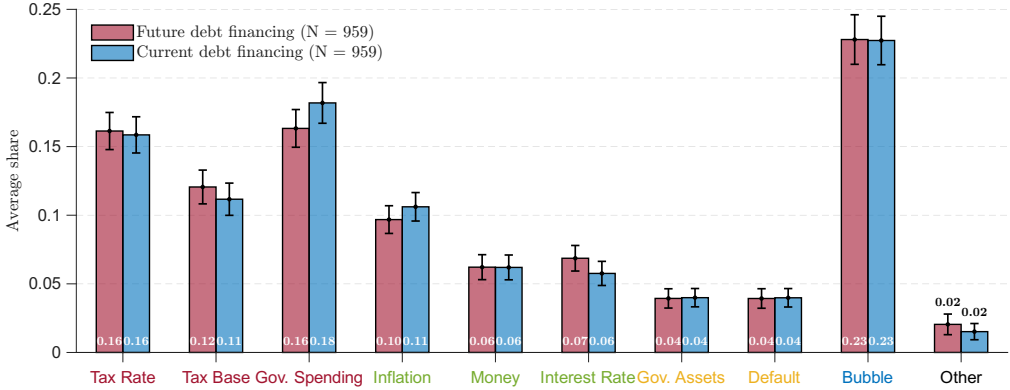
# Future Debt Financing




**Hypothetical scenario**: *Imagine that **today is January 1, 2030**. The U.S. has a new president for about a year. Picture the U.S. economy performing as it generally does during normal times: not shrinking or struggling as it would in a recession, and not growing at an unusually fast pace. In other words, it's 'business as usual' for the economy—stable, with no major ups or downs. Imagine that on January 1, 2030, the U.S. national **debt-to-GDP ratio is the same as in December 2024** (as a reminder, this national debt-to-GDP ratio was 97 percent).*

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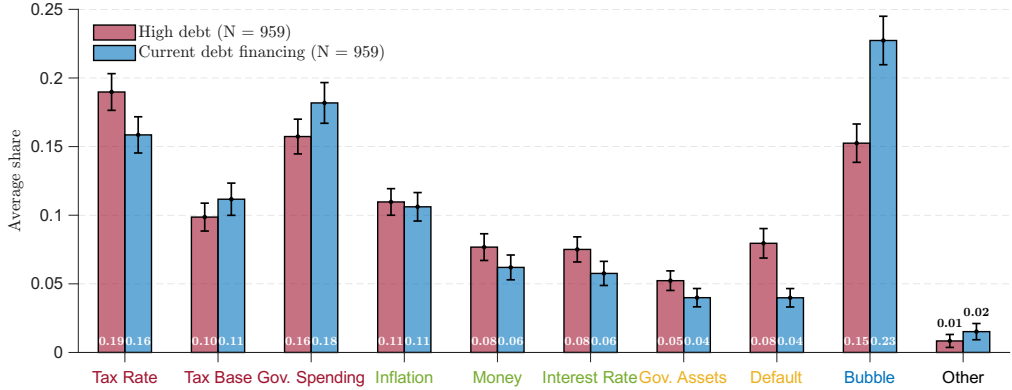
# Future Debt Financing: High Debt Level




**Hypothetical scenario**: *Imagine that **today is January 1, 2030**. The U.S. has a new president for about a year. Picture the U.S. economy performing as it generally does during normal times: not shrinking or struggling as it would in a recession, and not growing at an unusually fast pace. In other words, it's 'business as usual' for the economy—stable, with no major ups or downs. **Imagine that on January 1, 2030, the U.S. national debt-to-GDP ratio is 150 percent**, compared to 97 percent in December 2024.*

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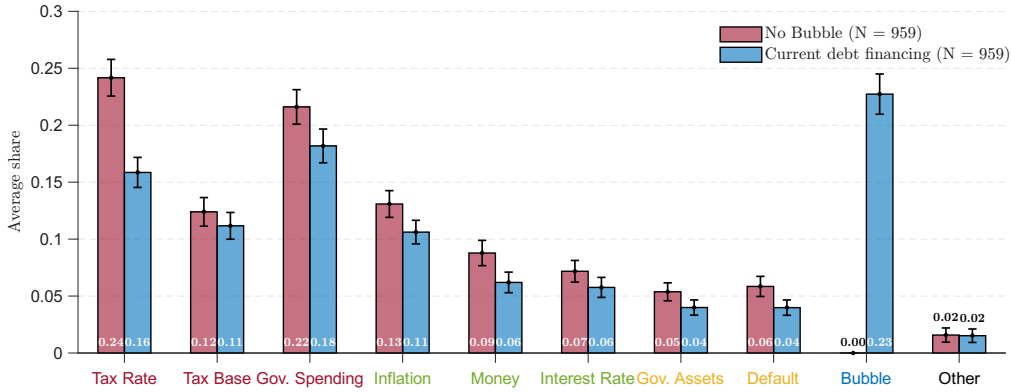
# Current Debt Financing: No Bubble




**Hypothetical scenario**: *Please imagine that the U.S. government* ***cannot continue borrowing*** *(rolling over the debt)* ***without collecting revenues above government spending*** *(on goods, services, and social programs). This may happen because investors no longer believe that future investors will purchase the debt, or because they no longer see U.S. government debt as a safe and liquid way to store their wealth, or because the government cannot force private banks to hold government debt.* ***In your opinion, what will the U.S. government do, both in the near and distant future, to handle its debt in this hypothetical scenario?***

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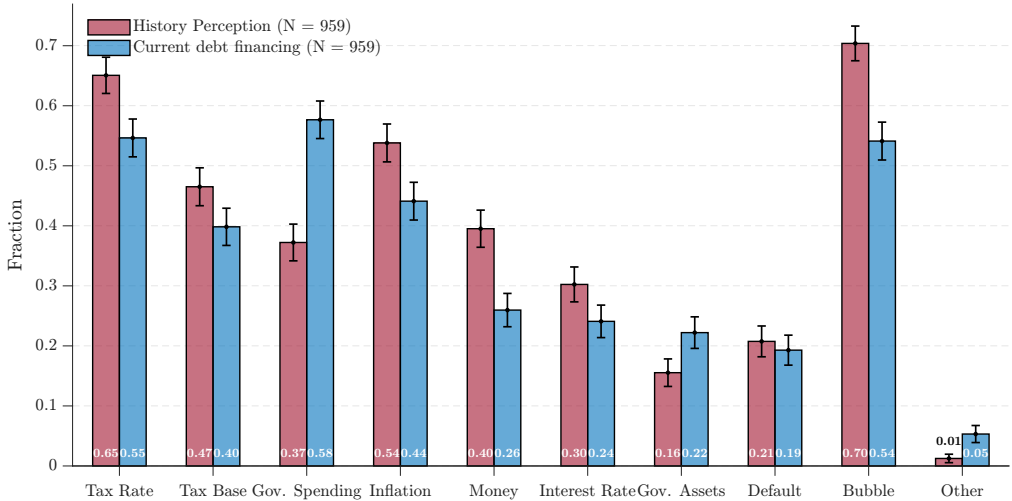
# Historical Perception




**Question**: *How in your view the U.S. federal government handled its debt in the past?*

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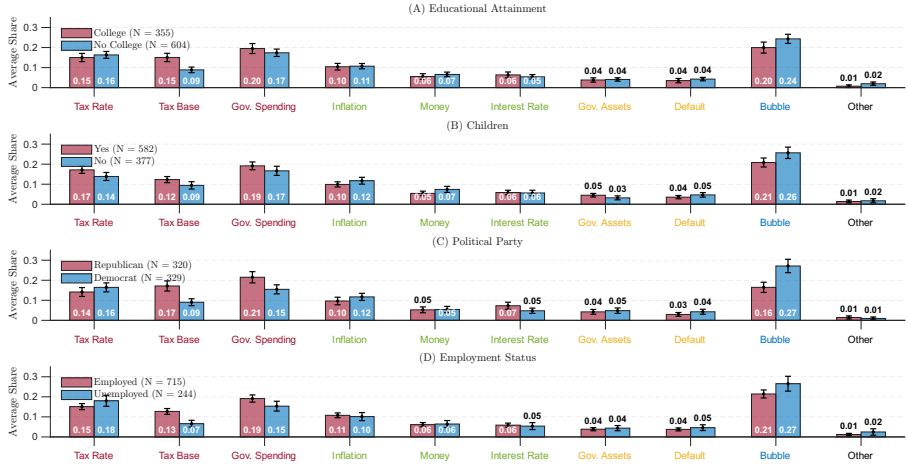
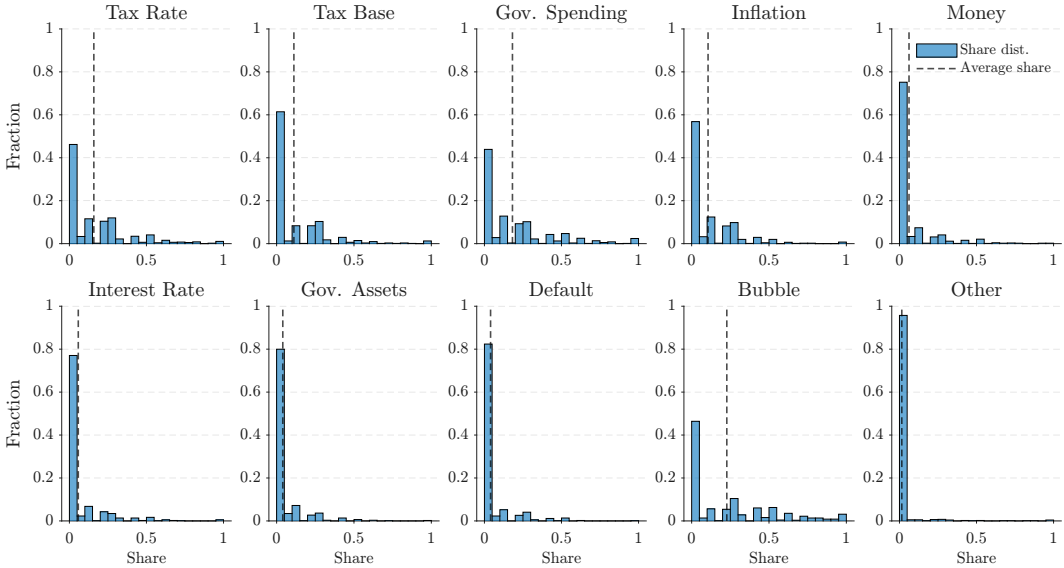
# Heterogeneity Explained by Observables

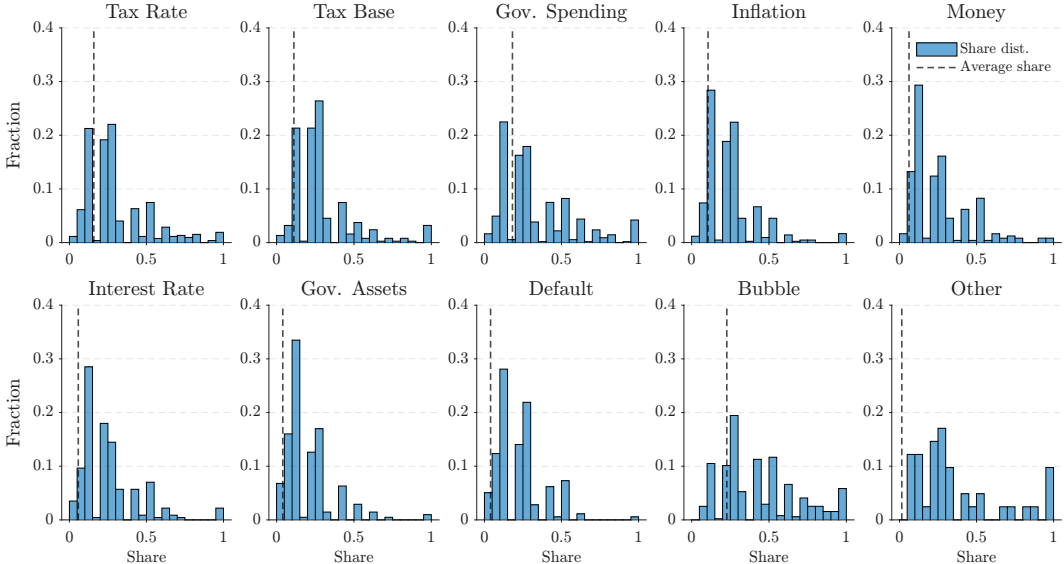
1. **Seemingly Unrelated Regression (SUR)** with 13 regressors, $R^2 < 0.05$
2. Average shares conditional on significant individual characteristics (raw data):



# Total Variation



# Total Variation (No Zeros)



# Government Military Purchases: Wording

## Definition

*We will be interested in **government military spending on goods and services**. This spending serves to meet current military needs. New body armor, radios, and drones are examples of spending on goods. An example of spending on services is the salaries of military personnel. Note that this type of spending excludes investments, such as building new military bases, aircrafts, and ships.*

## Details

*Imagine that on January 1, 2030, the U.S. government unexpectedly announces and starts implementing a change in military spending on goods and services. Here are more details about this policy.*

- ***Size**. The military spending increases by 10 percent relative to US output (that is, GDP) or, equivalently, by about $3 trillion (about $9,000 per U.S. resident).*
- ***Duration**. The change lasts for one year.*
- ***Other spending**. This change does not affect other types of government spending.*
- ***Financing**. Over this year, the government will issue national debt to finance this spending change. That is, the government debt-to-GDP ratio will increase by 10 percentage points.*
- ***Rationale**. The change happens even though the government has not revised its assessment of national security or economic conditions.*

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# Government Military Purchases: Quiz

## Quiz

*We now want to assess how clear the scenario description was.* ***Please choose all correct statements about the hypothetical government spending change just described. Do not choose incorrect statements.***

1. *The spending change lasts for 6 months.*
2. *Government military spending on goods and services buys new military equipment, such as radios, and pays military personnel.*
3. *The size of the hypothetical government spending change is 10 percent relative to US output.*
4. *The government immediately increases taxes to finance the hypothetical change in government spending.*
5. *The government increases its spending on military goods and services.*
6. *Government military spending on goods and services includes building new hydroelectric power plant.*

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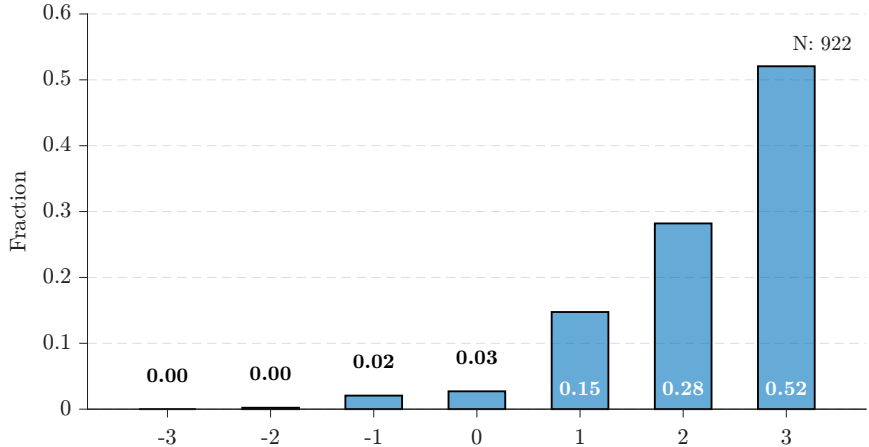
# Government Military Purchases: Quiz Results




Quiz score = # of correct answers - # of wrong answers

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# Government Transfers: Wording

*Imagine that on January 1, 2030, the U.S. government unexpectedly announces that it will give the same cash payment to every U.S. resident and immediately starts distributing the money. Here are more details about this policy.*

- ***Size**. The total value of these transfers is 10 percent relative to US output (that is, GDP) or, equivalently, about $3 trillion (about $9,000 per U.S. resident).*
- ***Duration**. The change lasts for one year.*
- ***Other spending**. This change does not affect other types of government spending.*
- ***Financing**. Over this year, the government will issue national debt to finance this spending change. That is, the government debt-to-GDP ratio will increase by 10 percentage points.*
- ***Rationale**. The change happens even though the government has not revised its assessment of national security or economic conditions.*

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# Government Transfers: Quiz

*We now want to assess how clear the scenario description was.* ***Please choose all correct statements about the hypothetical government spending change just described. Do not choose incorrect statements.***

1. *The transfers occur annually for five years.*
2. *The government immediately cuts military spending to finance the transfers.*
3. *The size of these transfers is 10 percent of U.S. output.*
4. *The government immediately increases taxes to finance the transfers.*
5. *The transfers are unexpected news for the population.*
6. *The government transfers are not related to economic conditions in the U.S.*

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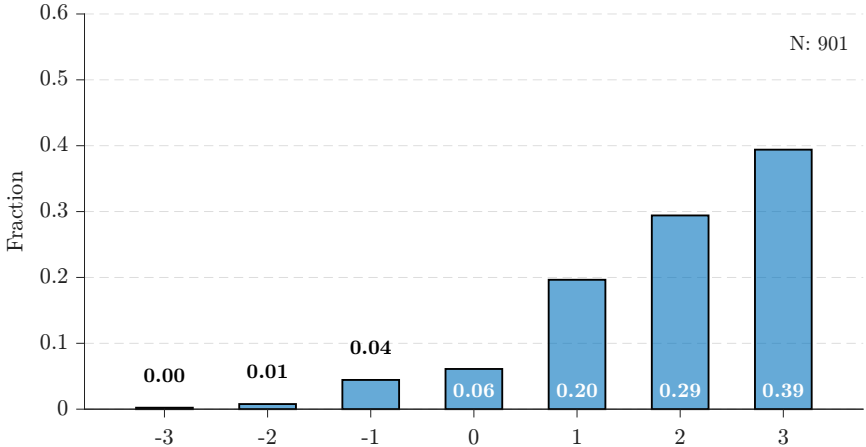
# Government Transfers: Quiz Results




Quiz score = # of correct answers - # of wrong answers

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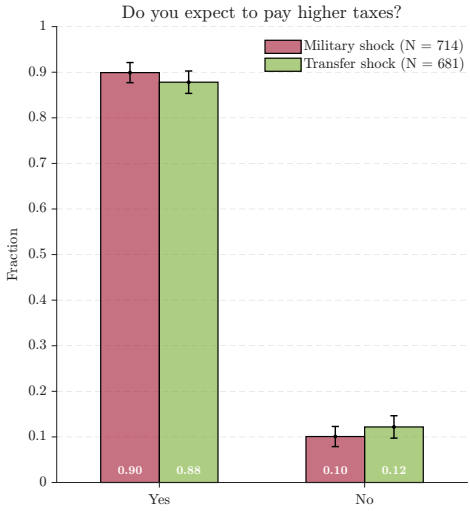
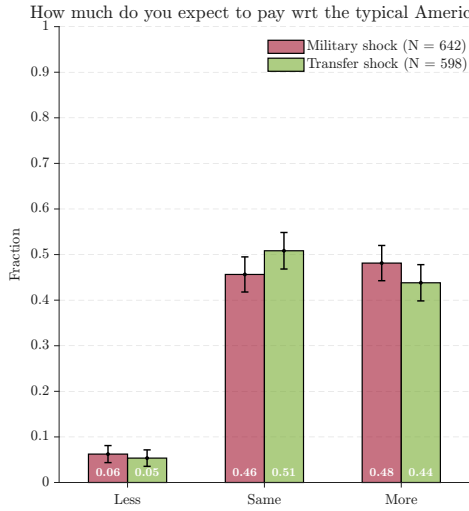
# Individual Taxes

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# Model Details: Representative Household

The household chooses $\left\{y_t^j, p_t^j, h_t^j, \left[c_t^j(k)\right]_{k=0}^1, B_t^{s,j}, B_t^j, M_t^j\right\}_{t=0}^{\infty}$ to maximize

$$\mathbb{E}_t \sum_{t=0}^{\infty} \beta^t \left[ \frac{\left(c_t^j\right)^{1-\sigma^{-1}} - 1}{1-\sigma^{-1}} + \chi_b \ln\left(\frac{B_t^j}{p_t}\right) + \chi_m \ln\left(\frac{M_t^j}{p_t}\right) - \iota \frac{\left(h_t^j\right)^{1+\varphi^{-1}}}{1+\varphi^{-1}} - \frac{\gamma}{2}\left(\frac{p_t^j}{p_{t-1}^j} - 1\right)^2 \right]$$

s.t.: $\int_0^1 p_t(k) c_t^j(k) dk + M_t^j + q_t^s B_t^{s,j} + q_t B_t^j + p_t f_t = p_t^j y_t^j - \tau_t + (B_{t-1}^{s,j} + B_{t-1}^j) + M_{t-1}^j$

$$y_t^j = a h_t^j$$

$$y_t^j = \left(\frac{p_t^j}{p_t}\right)^{-\varepsilon} c_t$$

$$c_t^j = \left[\int_0^1 c_t^j(k)^{\frac{\varepsilon-1}{\varepsilon}} dk\right]^{\frac{\varepsilon}{\varepsilon-1}}$$

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| Parameter | Description | Value |
|---|---|---|
| *Demand block* | | |
| $\sigma$ | EIS | 1 |
| $\varphi$ | Frisch elasticity | 1 |
| $\beta^Q$ | Discount factor | 0.974 |
| $\chi_b$ | Bonds in utility parameter | 0.1 |
| $\chi_m$ | Money in utility parameter | 0.024 |
| *Supply block* | | |
| $\widetilde{\kappa}$ | Phillips curve slope | 0.0066 |
| *Policy* | | |
| $\mu_y$ | Gov. spending-GDP elasticity | $-0.1$ |
| $\psi_y$ | Steady state average tax rate | 0.19 |
| $\psi_b$ | Tax revenues reaction to debt | 0.1 |
| $\phi_b$ | CB reaction to debt | $-0.0135$ |
| $\phi_\pi$ | CB reaction to inflation | 1.5 |
| $\vartheta_b$ | Sensitivity of gov. goods sales to debt | 0.002 |
| $s_g$ | Steady state gov. spending to GDP | 0.17 |

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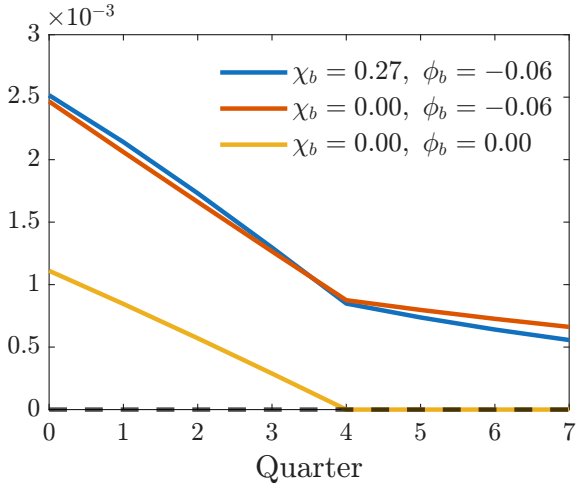
# Inflation Impulse Responses

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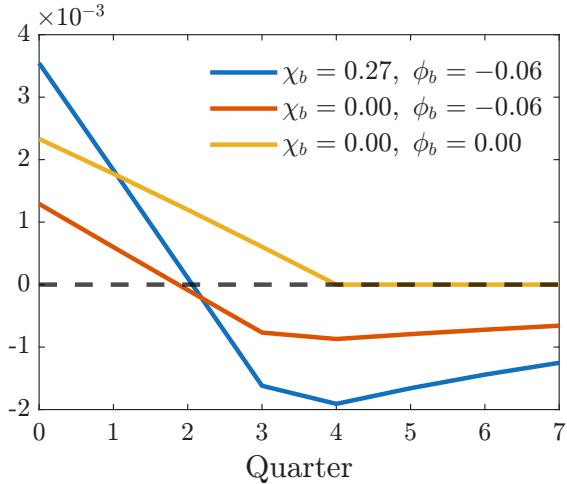
# Interest Rate Impulse Responses

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# Heterogenous Expectations Model