Fiscal Management of Aggregate Demand: The Effectiveness of Labor Tax Credits

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Motivation

■ Design of counter-cyclical policies

— Monetary policy: short-term nominal interest rate

— Fiscal policy: spending, unemployment benefits, lump-sum checks

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- A policy-driven approach

  − Quantitative HANK model

  − Effectiveness of various fiscal stabilization packages after a negative demand shock

Framework

- Standard HANK model with three additional components
  - Heterogeneous stochastic discount factors $\rightarrow$ heterogeneous mpc
  - An extensive labor supply margin $\rightarrow$ heterogeneous labor elasticities
  - Unemployment risk of heterogeneous incidence & varying with the cycle

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⇒ Relevant framework to quantify fiscal stabilization packages

- Demand-driven recession

  – Negative shock to marginal utility: unexpected, deterministic, transitory

Fiscal Stabilization Packages

- Three fiscal stabilization packages

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■ Three fiscal stabilization packages

    – Targeted-Transfer **(TT)** Package: a transfer targeted to low-income households

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⇒ The TC Package is the most effective to stabilize the economy

  – Output multiplier above 0.9, compared to ≈ 0.6 for UI & 0.4 for TT

  – Despite the larger unemployment risk

  – Operates through both consumption and labor supply

- Robustness and implementability

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- Other fiscal packages: Consumption tax cuts?

Literature

- Effects of monetary policy and government spending in HANK models

  Kaplan, Moll, and Violante (2018), Hagedorn, Manovskii, and Mitman (2019), Bilbiie (2020), Auclert, Rognlie, and
  Straub (2023), Ferriere and Navarro (2024), Alves and Violante (2023)

- Quantitative effects of UI extensions in recessions

  Mitman and Rabinovich (2015), Kekre (2022), Gorn and Trigari (2024), Bardoczy and Guerreiro (2023), Broer, Druedahl,
  Harmenberg, and Oberg (2024)

- Optimal fiscal and monetary policy in HANK

  Bhandari, Evans, Golosov, and Sargent (2021), Le Grand and Ragot (2024), McKay and Wolf (2023)

- Stabilization and labor taxes in HANK

  Broer et al. (2025), Le Grand, Ragot and Bourany (2024)

Environment

A HANK model with some twists

- Households
    - Bond economy with borrowing constraint
    - Stochastic discount factors
    - Indivisible labor choice
    - Idiosyncratic labor productivity shocks + unemployment shocks

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- NK block with sticky prices
  - Linear technology in labor
  - Monetary authority implements a standard Taylor rule

- Government
  - Finances spending, transfers, and UI benefits with debt, labor taxes, and capital taxes

- Individual state: asset a, discount factor β, productivity x, and employment $\eta \in \{\ell, u\}$

Households **Working households**

- Individual state: asset a, discount factor β, productivity x, and employment $\eta \in \{\ell, u\}$

- Value function when employment "island" $\eta = \ell$

$$V_t(a, x, \ell, \beta) = \max_{c,h,a'} \{\log c - Bh + \beta \mathbb{E}_t [V_{t+1}(a', x', \eta', \beta')|x, \beta, \ell)]\} \quad \text{s.t.}$$
$$c + a' = a + y^\ell + y^k - \mathcal{T}_t(y^\ell, y^k) + T_t + d_t^h(x),$$
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- AR(1) process for discount factor, productivity and employment status

- Flat capital tax τ^k, progressive loglinear labor tax (λ_t, τ^ℓ)
  Heathcote, Storesletten, and Violante (2017)

Households <small>Unemployed households</small>

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   – Unemployment benefits function of hourly wage

     Kekre (2022)

$$\mathcal{B}_t(w_t x) = \zeta \min \left(\mathcal{R} w_t x \bar{h}, \overline{ui} \right) + \chi w_t x \bar{h}$$

      $+ \zeta$ to match fraction of recipients, $\mathcal{R}$ the replacement rate, $\overline{ui}$ the UI cap

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Firms

- Standard two-layer structure with a final-good producer and intermediate good producers
  - Sticky prices a la Rotemberg

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- Fiscal rule with parameter Φ_D for public debt, λ_t clears the budget constraint
  Uhlig (2010)
  - $\Phi_D = 0$ for constant debt, all adjustment in tax level
  - $\Phi_D \to 1$ for constant taxes, all adjustment in debt

Calibration

Steady State Households

- Quarterly model calibrated to liquid wealth

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- Stochastic $\beta \in \{\bar{\beta} - \Delta, \ \bar{\beta}, \ \bar{\beta} + \Delta\}$, duration of 50 years Krusell and Smith (1998)

    - $\bar{\beta}$ s.t. $r \equiv 3.5\%$ annually

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- Productivity $(\rho_x, \sigma_x) = (0.989, 0.287)$
  Chang and Kim (2007)

Steady State Firm and government

- Technology: $\varepsilon = 7$, $\Theta = 200 \rightsquigarrow$ Phillips curve slope $\varepsilon/\Theta = 0.035$
  Galí and Gertler (1999)

- Dividends redistributed linearly in x: $d_t(x) = \bar{d}_t x$
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  - Spending $G/Y = 10\%$, transfers $T/Y = 8\%$, debt $D/Y = 100\%$

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    $\qquad\qquad\qquad\quad \chi = 0.15$ to match $C_u/C_e \approx 75\%$

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  - Automatic responses of inflation and debt: $\Phi_\Pi = 1.5$, $\Phi_D = 0.75$

Dividends

Steady State Unemployment

- Job finding rates and separation rates across hourly wage distribution

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- Job finding rates are constant in the distribution
  Mueller (2017)

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- Separation rates are falling in hourly wage/productivity x
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  – Monthly separation rates of $\approx 1.4\%$ and 0.7% below and above median, respectively

  $\Rightarrow \pi_\eta(u|\ell, x) = \phi_0 x^{\phi_1}$, with $\phi_0 = 0.029$ and $\phi_1 = -0.446$

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- Average unemployment rate at 4.3% with unequal incidence in the distribution

Steady State Unemployment in the Distribution
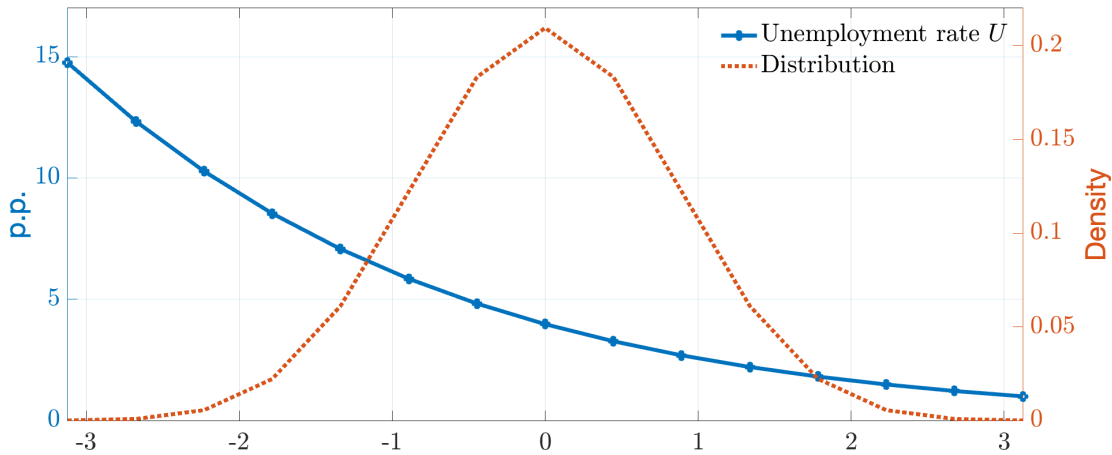
Unemployment and the Business Cycle

■ Okun's law type of relation between output and unemployment

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    + Homogeneous additive increase in separation rates
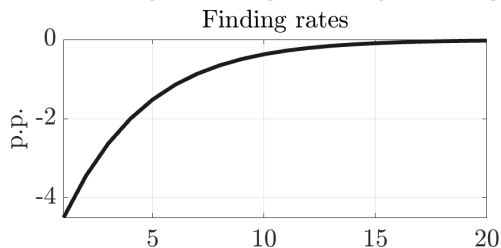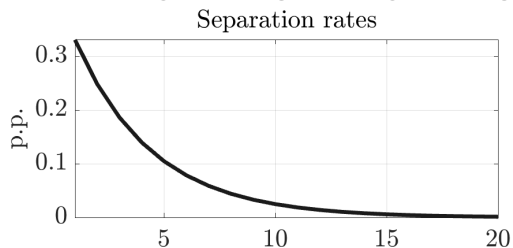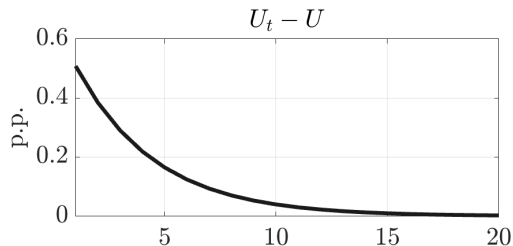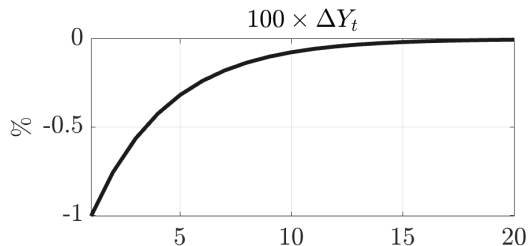
Unemployment and the Business Cycle Okun's law
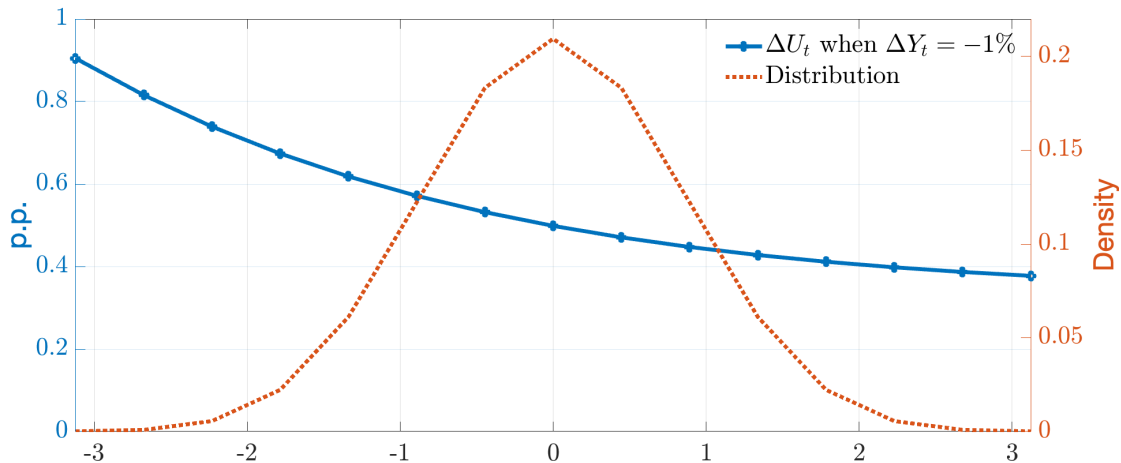
Investigating the Calibration

- Household responses: labor elasticities and MPCs

- Aggregate responses to changes in taxes

Investigating the Calibration Household responses

- Labor elasticities decline with income
  Triest (1990), Eissa and Liebman (1996), Kleven and Kreiner (2006), Meghir and Phillips (2010), . . .

  - Compute labor responses to a 1% change in after-tax rate: average annual elasticity at 0.30
    Erosa, Fuster, and Kambourov (2016)

Income quartile	1	2	3	4
Labor elasticity	0.44	0.34	0.25	0.22

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■ Marginal propensities to consume (mpc) Parker, Souleles, Johnson, and McClelland (2013), Kaplan and Violante (2014), . . .

– Compute mpc out of a $500 rebate: average quarterly mpc at 0.13

– Decline with wealth: from 0.20 to 0.03 from 1st to 4th wealth quartile

– Larger for unemployed at 0.32, consumption drops by 10% when falling into unemployment

Saporta-Eksten (2014), Ganong and Noel (2019)

- Further investigate aggregate effects of tax shocks

Investigating the Calibration Tax shocks

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- Compute tax multipliers as in Mertens and Ravn (2013)
  - Tax multiplier at about 0.6 in the model, vs. above 2 in the data
  - Peaks on impact in the model, at 3 quarters in the model

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- Replicate a tax shock on bottom-90 vs. top-10 as in Zidar (2019)
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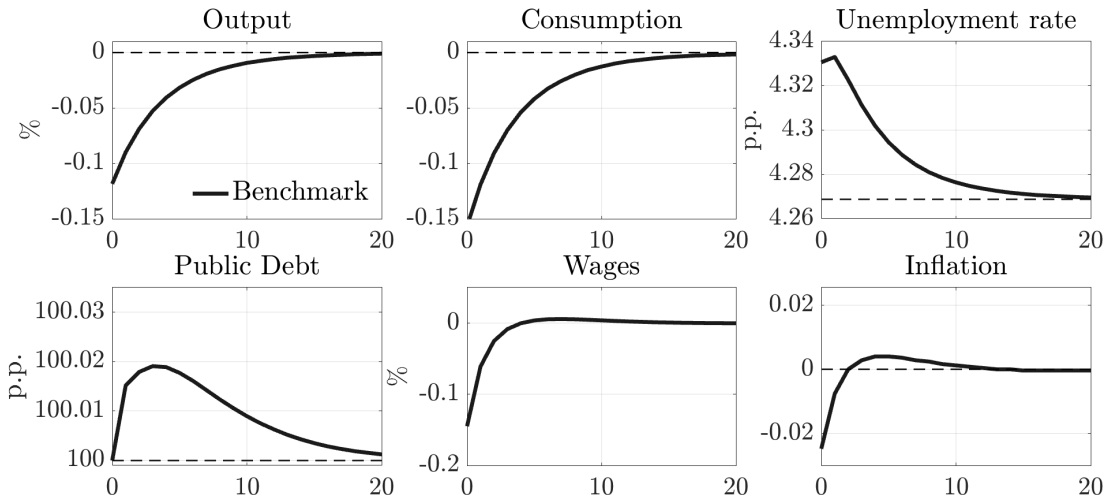 - Peaks on impact in the model, at 2 years in the model

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⇒ Conservative calibration regarding tax responses

Recession

Benchmark No Fiscal Stabilization

- Recession induced by a negative demand shock: $(1 - \omega_t)u(c_t, n_t)$
  - ω_0 such that $\Delta Y_t = -0.1\%$ on impact
  - Reverts to $\omega = 0$ with persistence $\rho_\omega = 0.75$ at the quarterly level

- Unexpected, transitory, perfect foresight: a 'MIT' shock

Benchmark No Fiscal Stabilization

- A Targeted Transfer **(TT)** Package
  - Design to mimic checks sent in 2008: For all low-income households, based on last-year income
  - An "automatic stabilizer" flavor: Phase out over time with persistence ρ_ω

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    – Temporary transfer modeled as a logistic function
      Ferriere, Grübener, Navarro, and Vardishvili (2023)

    $$\hat{T}_t(y) = m_t \frac{2\exp(-\chi y/\bar{y})}{1+\exp(-\chi y/\bar{y})}, \quad m_t \text{ the transfer at } y=0, \; \chi \text{ the phasing-out speed}$$

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Three Fiscal Stabilization Packages TT Package

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    + "Based on last-year income": $\tilde{y}(x, \eta, \beta)$

  - Calibration such that *total cost* equals a one-time check of \$200 to all households

    + Initial check at $y = 0$ is $m_0 = \$900$

    + Quick phase-out at $\chi = 12$: only 20% households receive more than \$50 at $t = 0$

- A Unemployment Insurance **(UI)** Package
  - A check to all unemployed households, phase out with persistence ρ_ω

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    - Calibration such that equals a one-time lump-sum check of $200

        + Initial check equal to $1,1000

Three Fiscal Stabilization Packages UI Package & TC Package

- A Unemployment Insurance **(UI)** Package
    - A check to all unemployed households, phase out with persistence ρ_ω
    - Calibration such that equals a one-time lump-sum check of $\$200$
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    - A check to working low-income households, phase-out over time at rate ρ_ω

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    - Eligible **only if** $\eta = e$ and $h = \bar{h}$

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    - Calibration such that equals a one-time lump-sum check of $200

        + Initial maximum check of $800, slower phase-out at $\chi = 6$

Stabilization Packages Impulse Response Functions
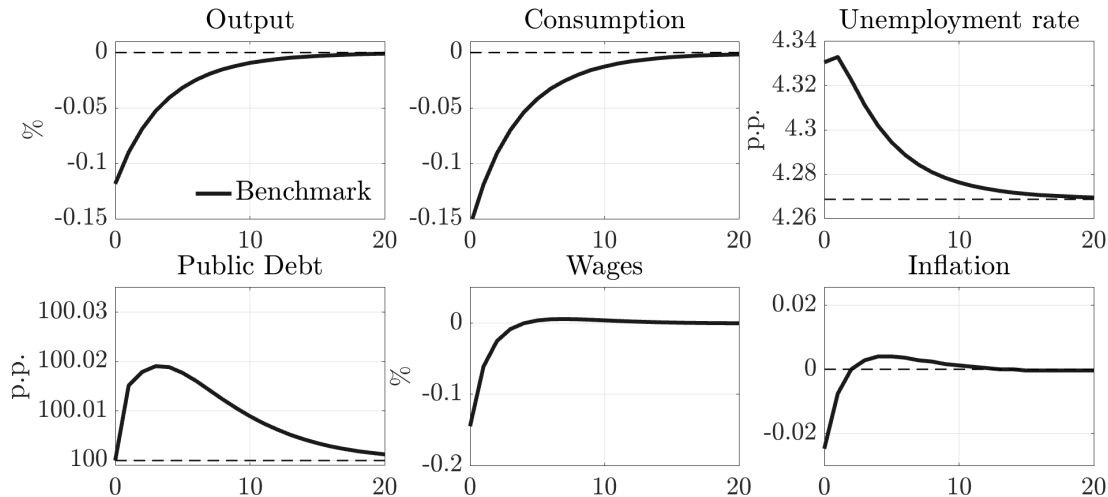
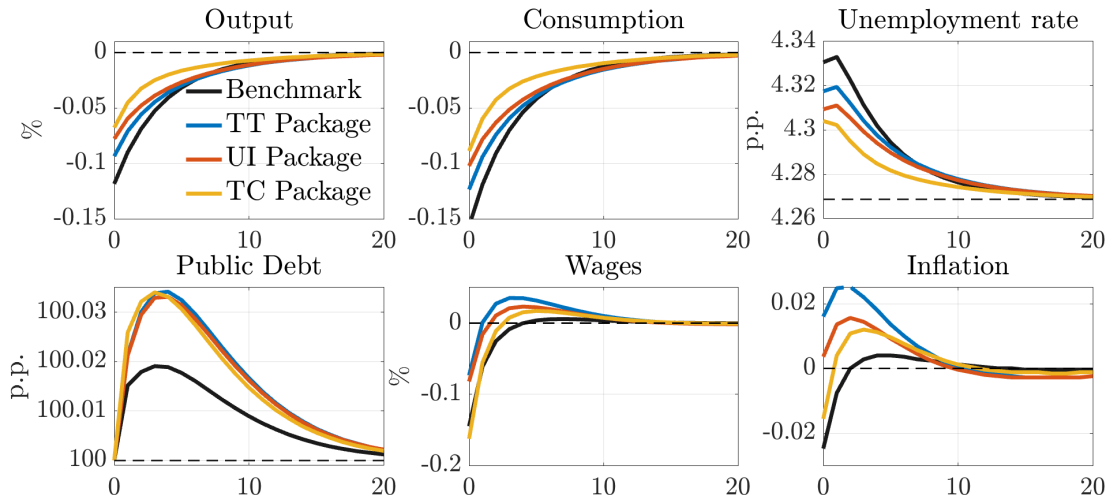# Stabilization Packages Impulse Response Functions

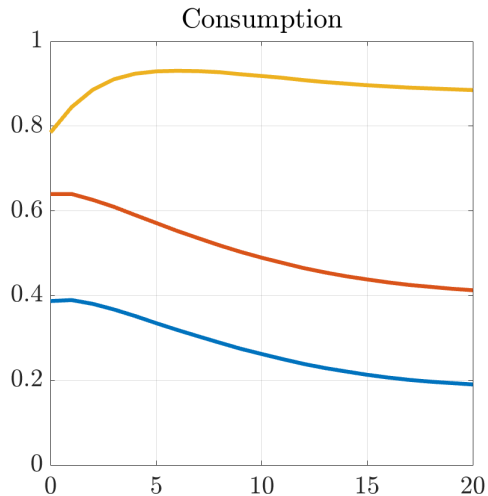# Stabilization Packages Impulse Response Functions

Stabilization Packages Impulse Response Functions

Stabilization Packages Multipliers

Output
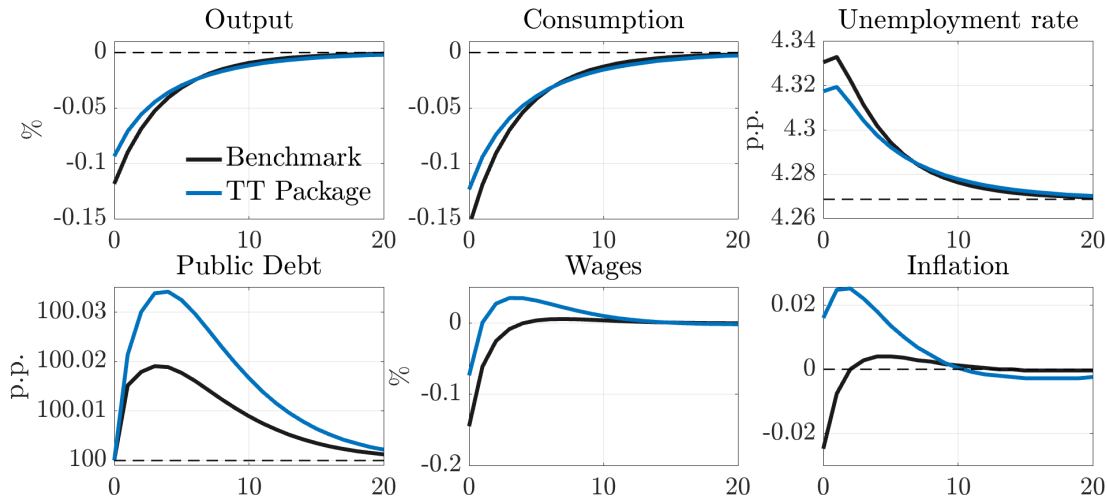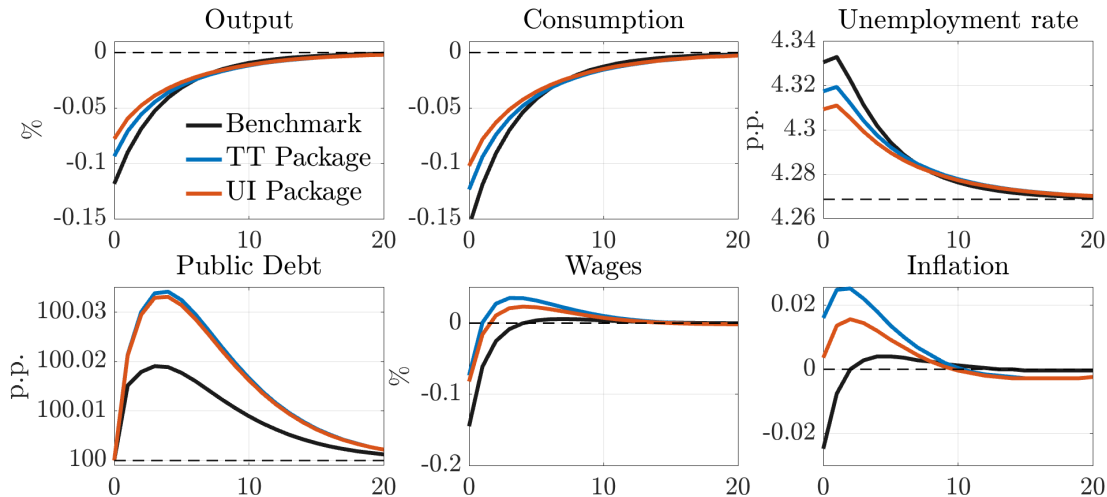
Consumption
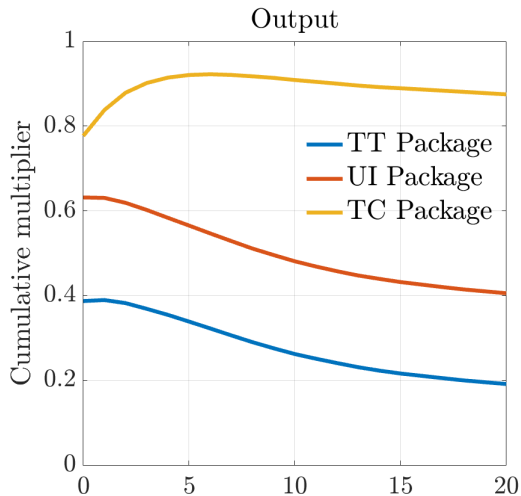
- TT Package
- UI Package
- TC Package

Stabilization Packages Decomposition

- Decomposition between *consumption channel* and *labor channel*

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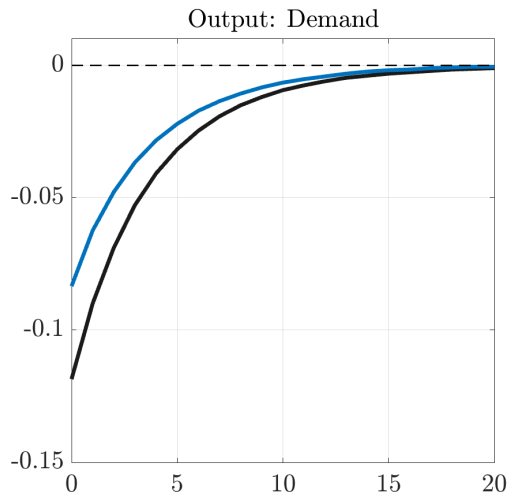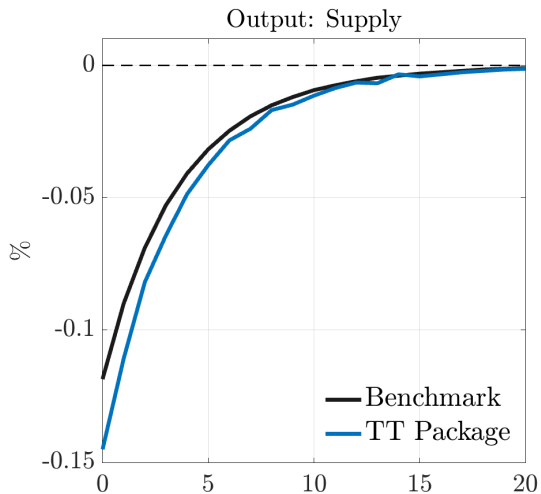 - Use equilibrium prices and taxes and unemployment risk of the no-stabilization benchmark

  $$\{r_t^b, w_t^b, \lambda_t^b, \pi_{\eta,t}^b, d_t^b\}$$
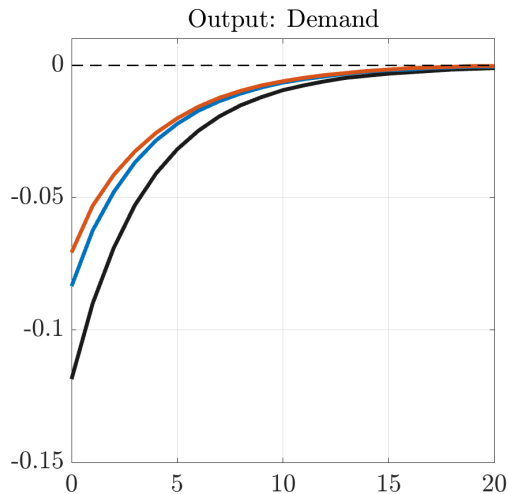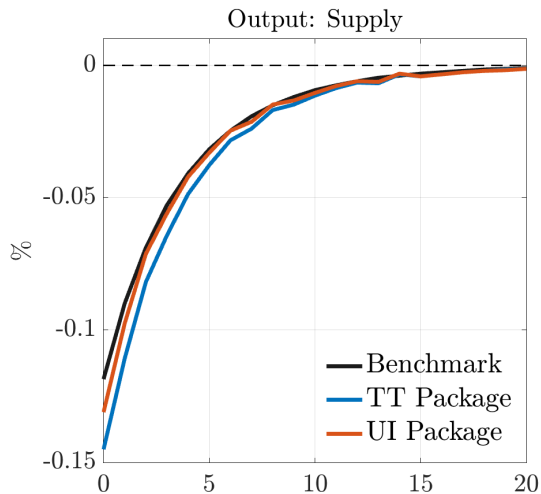
  - Compute for each package TT, UI, TC
    - + Supply output $Y_t^s = L_t$ using households' labor supply policy
    - + Demand output $Y_t^d = C_t + \Theta_t + G_t + f$ using households' consumption policy

Three Fiscal Stabilization Packages Decomposition

Output: Supply — Output: Demand

Benchmark
TT Package

Three Fiscal Stabilization Packages Decomposition

Output: Supply — Output: Demand

Benchmark
TT Package
UI Package

Three Fiscal Stabilization Packages Decomposition
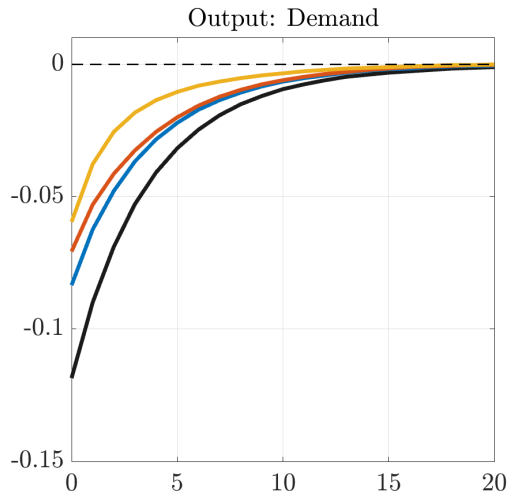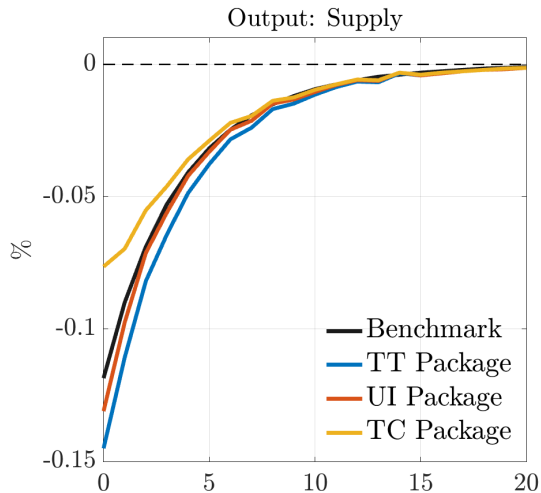
Taking Stock

- Temporary tax credits are an effective fiscal stimulus
  - Implement labor tax cuts targeted to low-income workers

- Caveats on the quantification of the UI package
  - Do not internalize the negative incentive effects on job search [overestimate]
  - Abstracts from heterogeneity between recipients and non-recipients [underestimate]

Investigating the Results

1. Role of public debt

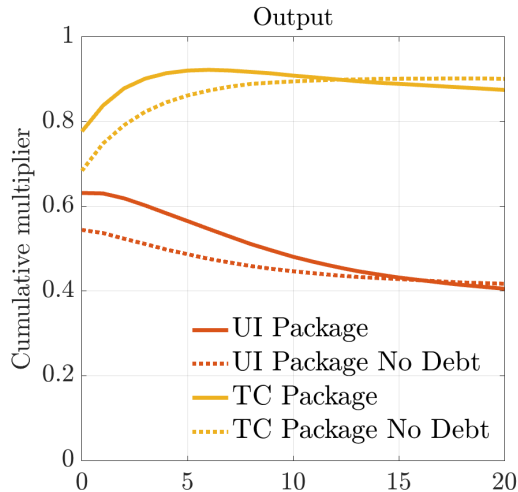2. Distributional effects across packages

3. Alternative rules for monetary policy

4. Implementability

5. (Deeper recession)

1. Role of Public Debt

- Compute benchmark and stabilization output
  paths with constant debt $\Phi_D = 0$

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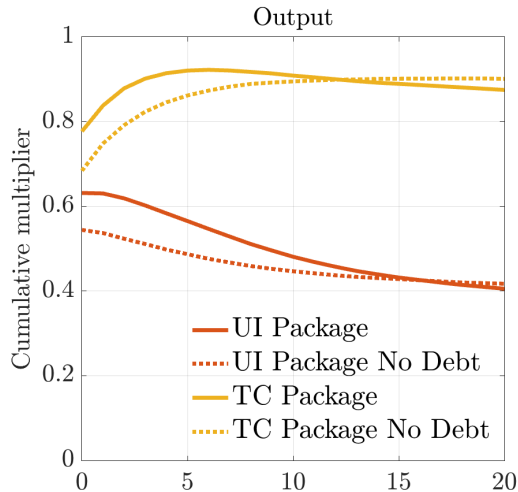- Public debt does help to stabilize

Output

1. Role of Public Debt

- Compute benchmark and stabilization output paths with constant debt $\Phi_D = 0$

- Public debt does help to stabilize

- TC Package No Debt $\equiv$ temporary shock in labor tax progressivity

  $\Rightarrow$ Stabilizes the economy

Output

Cumulative multiplier

— UI Package
⋯ UI Package No Debt
— TC Package
⋯ TC Package No Debt

2. Distributional Effects

- Consumption by income group
    - Compare with and without stablization

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- TT Package targets the lowest-income
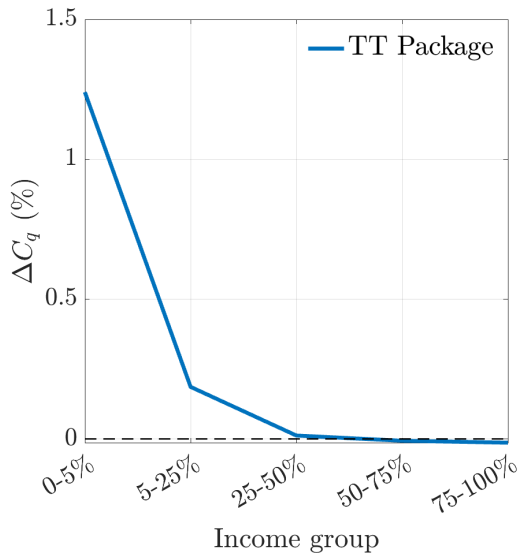
2. Distributional Effects

- Consumption by income group
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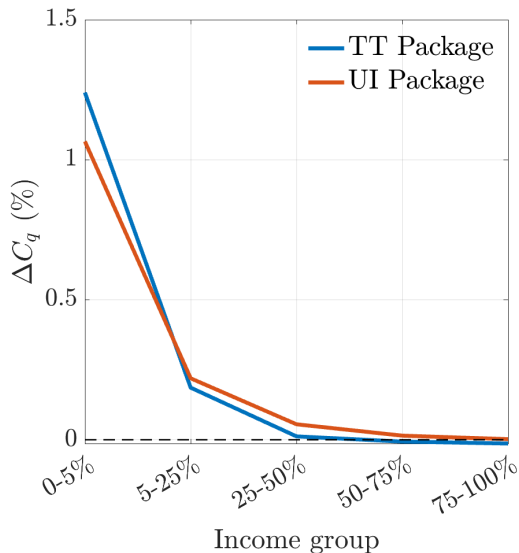- TT Package targets the lowest-income
  - Better than UI Package

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  - Better than UI Package
  - Better than TC Package

- Fiscal packages affect inflation differently
    - Monetary policy and real rate differ

- Compare packages under benchmark real rate
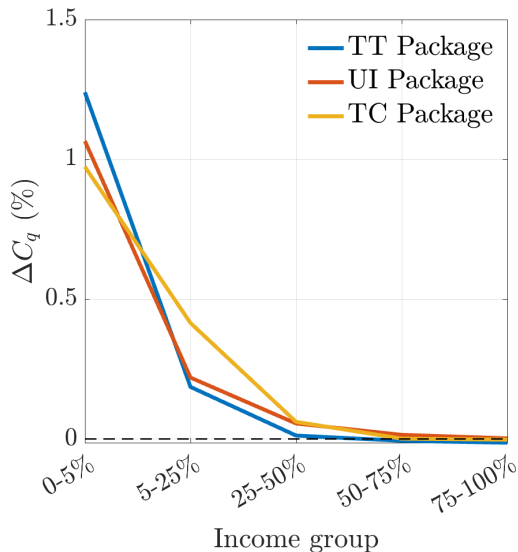
3. Monetary Policy Identical real rate

- Fiscal packages affect inflation differently
  - Monetary policy and real rate differ

- Compare packages under benchmark real rate

- TC package remains most effective
  - Larger multipliers than with Taylor rule
  - Especially for the TT package, less for the TC package

Output: real rate target
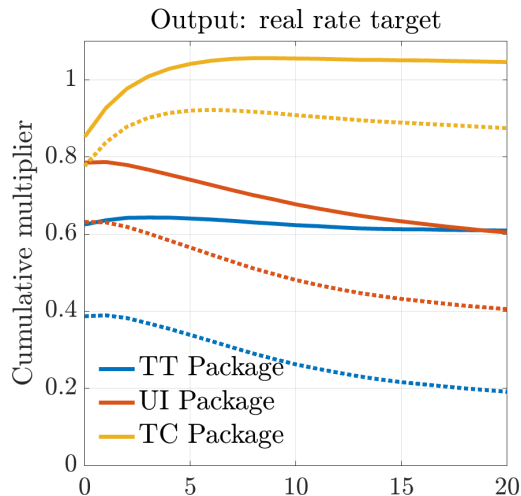
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■ Can we actually change taxes at business cycle frequency?

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    - Child tax credit expansion under the American Rescue Plan
    - Transfers are also commonly used

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- Systematic fluctuations in payroll taxes could implement the TC package
  - Easy to implement, would appear on the paycheck of workers every month

Further Fiscal Packages

- Two other typical fiscal stabilization packages
  - Government spending shock with persistence ρ_w
  - A one-time lump-sum check to all households, of an amount of $\$200$

- Consumption taxes?

Further Fiscal Packages G and T **packages**

— Public spending generates large output
  multiplier

    + ...but negative consumption multiplier

Output

Cumulative multiplier

— TC Package
— Public spending

— Public spending generates large output multiplier

  + ...but negative consumption multiplier

— Lump-sum check has modest stabilization properties
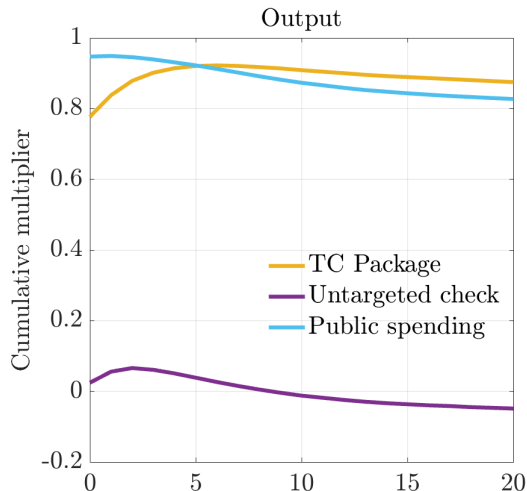
Output

Further Fiscal Packages C package?

- New proposal to use consumption taxes as an automatic stabilizer
  Blanchard (2024)

Further Fiscal Packages C package?

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  Blanchard (2024)

- A formal comparison of two fiscal stimulus:
    - A government spending (expansion) stimulus $\{\hat{G}_t\}_{t=0}^T$
        + Fiscal cost $\{R_t^g = \hat{G}_t - G\}_{t=0}^T$
        + Associated paths for allocations and prices: $\{Y_t^g, L_t^g, r_t^g, w_t^g, ...\}_{t=0}^T$
    - A consumption tax (cut) stimulus $\{\hat{\tau}_t^c\}_{t=0}^T$
        + Fiscal cost $\{R_t^c = \tau^c C - \hat{\tau}_t^c C_t\}_{t=0}^T$
        + Associated paths for allocations and prices: $\{Y_t^c, L_t^c, r_t^c, w_t^c, ...\}_{t=0}^T$

Proposition: Assume log separable preferences: $U = \log c - v(n)$.

If two stimulus are such that $R_t^c = R_t^g \ \forall t$, then:

   − The paths for output and labor are identical across the two packages :

$$\{Y_t^c, L_t^c\} = \{Y_t^g, L_t^g\}$$

Further Fiscal Packages C package?

Proposition: Assume log separable preferences: $U = \log c - v(n)$.

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$$\{Y_t^c, L_t^c\} = \{Y_t^g, L_t^g\}$$

- The paths for prices (and etc.) are identical across the two packages :

$$\{r_t^c, w_t^c, \Pi_t^c, d_t^c, \lambda_t^c, D_t^c\} = \{r_t^g, w_t^g, \Pi_t^g, d_t^g, \lambda_t^g, D_t^g\}$$

- The paths for consumption compare as follows:

$$C_t^c + G_t^c = C_t^g + G_t^g$$

- With log preferences, using the budget constraint

$$(1 + \tau_t^c)c + a' = y_t^\ell + y_t^k - \mathcal{T}_t + d_t + ...$$

to replace c in the household's problem delivers

$$V_t(a, x, .) = \max_{h, a'} \left\{ \log \left(y_t^\ell + y_t^k - \mathcal{T}_t + d_t + ... - a' \right) - Bh + \beta \mathbb{E}_t V_{t+1}(a', x', .) \right\} - \log(1 + \tau_t^c)$$

Further Fiscal Packages Intuition

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- Consider household & firm decisions and prices & taxes for the G-stimulus
- Consistent with households decisions for $\{h, a'\}$ in the C-stimulus as independent of τ_t^c
- Consistent with firms decisions
- Consistent with government's budget constraint if identical cost
- Consistent with market clearing if and only if $C_t^c = C_t^g + (G_t^g - G_t^c)$

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- Robust to: capital, sticky wages, also in RANK, etc. Key assumption: log preferences

- Consumption tax cuts as automatic stabilizers
    - As effective as public spending to stimulate aggregate demand
    - Much more effective than direct transfers

Stabilization Packages Multipliers

- Consumption tax cuts as automatic stabilizers

    – As effective as public spending to stimulate aggregate demand

    – Much more effective than direct transfers

    – Easy to implement

    – Welfare of private vs. public consumption?

Conclusion

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- A temporary increase in labor income tax progressivity can stabilize the economy
    - Operates also through consumption and labor supply responses

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Thank you!

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    Journal of Political Economy 127.3, pp. 1437–1472.

Fiscal Rule

- Public debt adjusts as a function of Φ_D

$$D_{t+1} = (1 - \phi_D)D + \phi_D \left(\hat{G}_t - \tau^k r_t A_t - \mathcal{R}_t^\ell \right), \text{ where}$$

  - $\hat{G}_t$ captures total government expenditures, including debt repayments

  $$\hat{G}_t = G_t + T_t + \mathcal{U}_t + (1 + r_t)D_t$$

  - $\mathcal{R}_t^\ell$ captures fiscal revenues at steady-state labor tax schedule

  $$\mathcal{R}_t^\ell = w_t L_t - \lambda \int (w_t x h_t(a, x, \eta, \beta))^{1-\gamma} d\mu_t(a, x, \eta, \beta)$$

Dividends

- Assume dividends linearly distributed on x

$$\delta_t = \sum_x \tilde{\delta}_t(x)\pi(x) = \sum_x \left(\frac{\delta_t}{\mathbb{E}[x]}x\right)\pi(x)$$

  – Minimize wealth effects of fluctuations in dividends

    Farhi and Werning (2020)

A.8

Unemployment and the Business Cycle Okun's law

- Finding and separation rates distribution depend on U_t Mueller (2017)

  - Finding rate elasticity decreases homogeneously with ΔY_t

  $$\log \pi_{\eta,t}(\ell|u,x) = \log \pi_\eta(\ell|u) - \log\left(1 - \bar{\phi}_e \Delta Y_t\right)$$

  - Separation rate elasticity increases with ΔY_t

  $$\pi_{\eta,t}(u|\ell,x) = \pi_\eta(u|\ell,x) - \bar{\phi}_u \Delta Y_t x^{-\phi_{u,x}}$$

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  $$\pi_{\eta,t}(u|\ell,x) = \pi_\eta(u|\ell,x) - \bar{\phi}_u \Delta Y_t x^{-\phi_{u,x}}$$

  – Joint calibration:

  + $\bar{\phi}_e$ s.t. finding elasticity to $U \approx -0.6$

  + $\phi_{u,x} = 0$ elasticity of separation rates larger for above-median workers

  + $\bar{\phi}_u = 0.33$ to get $c_{OK} = 0.5$

Labor elasticities Two approaches

- Labor elasticities decline with income

  - Compute labor responses to a temporary tax shock
    Erosa, Fuster, and Kambourov (2016)

    + Annual hours response to a 1% change in after-tax rate for one year

    + Aggregate labor elasticity is 0.30, declining with income

  - Simulate steady-state model annually and run applied-micro regression
    Rogerson and Wallenius (2009), Chang and Kim (2006)

    + Estimate b_1 in $\log h_{in} = b_0 + b_1 \log \tilde{w}_{in} - b_2 \log c_{in} + \varepsilon_{in}$

    + Aggregate labor elasticity is 0.45, declining with income

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        + Aggregate labor elasticity is 0.45, declining with income

Income quartile	1	2	3	4
Labor elasticity: tax shock	0.44	0.34	0.25	0.22
Labor elasticity: regression	0.56	0.59	0.50	0.26

- Marginal propensities to consume decline with wealth

Wealth quartile	1	2	3	4
mpc	0.20	0.15	0.07	0.03

Deeper Recessions Bigger Fiscal Packages

- Consider a recession of about 1% on impact – compared to 12bp on impact in the baseline

- Implement fiscal packages costing $\$1500$ per household

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- TC Package in the first quarter: equal to $1100 per month for the bottom 5%, $500 per month for the 5-15%

- UI Package in the first quarter: equal to $2800 per month for all unemployed

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- UI Package in the first quarter: equal to $2800 per month for all unemployed

- Multipliers are similar to the baseline

- Effectiveness of fiscal packages depend on constraints on monetary policy

- Consider a richer Taylor rule:

$$\ln\left(\frac{1+i_{t+1}}{1+\bar{i}}\right) = \Phi_\Pi \ln\left(\frac{\Pi_t}{\bar{\bar{\Pi}}}\right) + \Phi_Y \ln\left(\frac{Y_t}{\bar{\bar{Y}}}\right)$$

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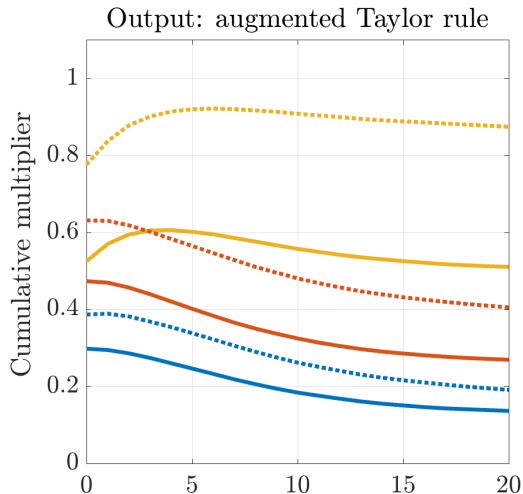
- TC package remains most effective
  - Lower multipliers than with Taylor rule


Output: augmented Taylor rule

– Lower variance ρ_h to reach steeper labor
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   + 0.75 at Q1 (regression), 1.1 (tax shock)

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- TC Package ⇒ **large output** multiplier
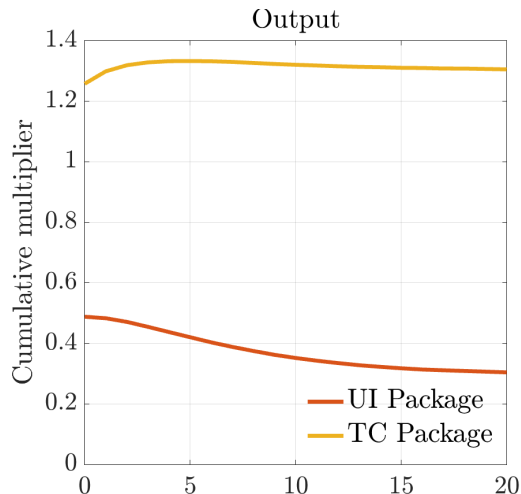
Output

Robustness <small>Sticky wages</small>

- Alternative modeling of nominal rigidities with sticky wages
  <small>Erceg, Henderson, and Levin (2000) Ferriere and Navarro (2024)</small>

  - Two-layer structure with a labor packer and labor unions

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- Competitive labor packer

  - Produces a final labor bundle combining labor from unions $N_t = \left(\int_0^1 n_{kt}^{\frac{\varepsilon-1}{\varepsilon}} \right)^{\frac{\varepsilon}{\varepsilon-1}}$

  $\Rightarrow$ Implies labor demand $n_{kt}^d = (W_{kt}/W_t)^{-\varepsilon} N_t$, where $W_t = w_t P_t$

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  - Set wages w_t subject to adjustment cost

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- Theorem: Under linear labor technology, **equivalence** between price and wage stickiness

Robustness Sticky wages

- Labor union maximization problem

$$J_t^w(W_{kt-1}) = \max_{W_{kt}, n_{kt}} \left\{ d_{kt}^w + \frac{1}{1 + r_{t+1}} J_{t+1}^w(W_{kt}) \right\} \quad \text{s.t.}$$

$$d_{kt}^w = \left(\frac{W_{kt}}{P_t} - w_t^h \right) n_{kt} - \Theta_t^w(W_{kt}, W_{kt-1}) - f_w$$

$$n_{kt} = \left(\frac{W_{kt}}{W_t} \right)^{-\varepsilon_w} N_t$$

$$\Theta_t^w(W_{kt}, W_{kt-1}) = \frac{\Theta^w}{2} \left(\frac{W_{kt}}{W_{kt-1}} - \bar{\Pi} \right)^2 N_t$$

⇒ Implies a standard wage Philipps Curve

◁