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

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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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$\Rightarrow$ Relevant framework to quantify fiscal stabilization packages

- Demand-driven recession
  - Negative shock to marginal utility: unexpected, deterministic, transitory

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$\Rightarrow$ 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

Environment

A HANK model with some twists

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  - Bond economy with borrowing constraint
  - Stochastic discount factors
  - Indivisible labor choice
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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

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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)

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    Kekre (2022)

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

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- Fiscal authority faces a standard budget constraint

$$G_t + (1 + r_t)D_t + T_t + \int \mathcal{B}_t(w_t x)d\mu_t = D_{t+1} + \int \mathcal{T}_t(y_t^\ell, y_t^k)d\mu_t$$

Fiscal rule

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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

Calibration Overview

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  Ferriere and Navarro (2024)
- Technology: $\varepsilon = 7$, $\Theta = 200 \rightsquigarrow$ Phillips curve slope $\varepsilon/\Theta = 0.035$
  Galí and Gertler (1999)
- Government
  - Standard calibration for taxes and unemployment benefits
  - Automatic responses of inflation and debt: $\Phi_\Pi = 1.5$, $\Phi_D = 0.75$

Unemployment Steady State and Business Cycles

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  Mueller (2017)

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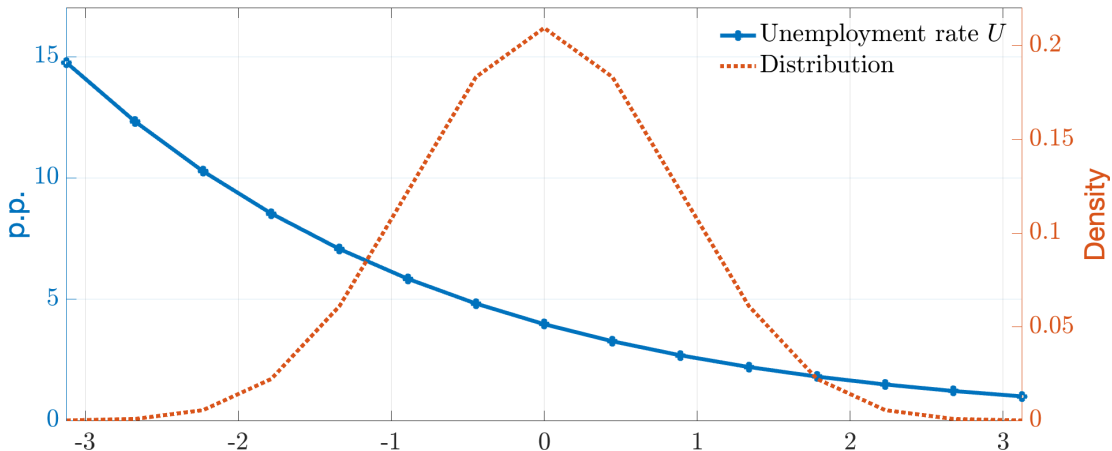
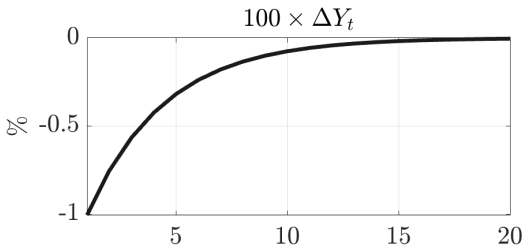
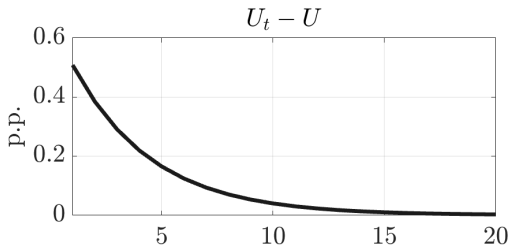
- Okun's law: Okun coefficient $c_{OK} = 0.5$
  Ball, Leigh, and Loungani (2017)
  - Job finding rates decrease (a lot) equally across households
  - Job separation rates decrease (a bit), higher elasticity for high-x households
    + Functional forms: additive fall in separation rates in recession delivers the pattern

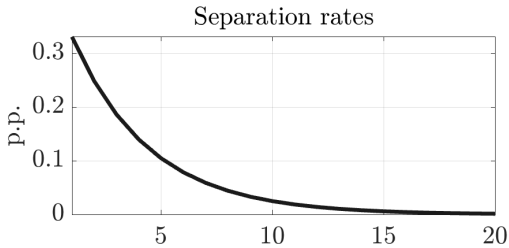
Unemployment Steady State

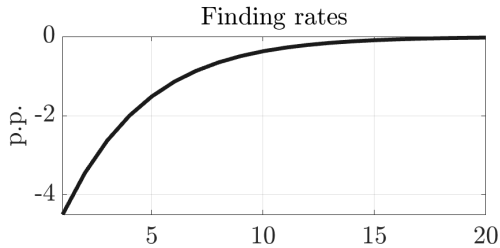


Unemployment Business Cycle: Okun's law









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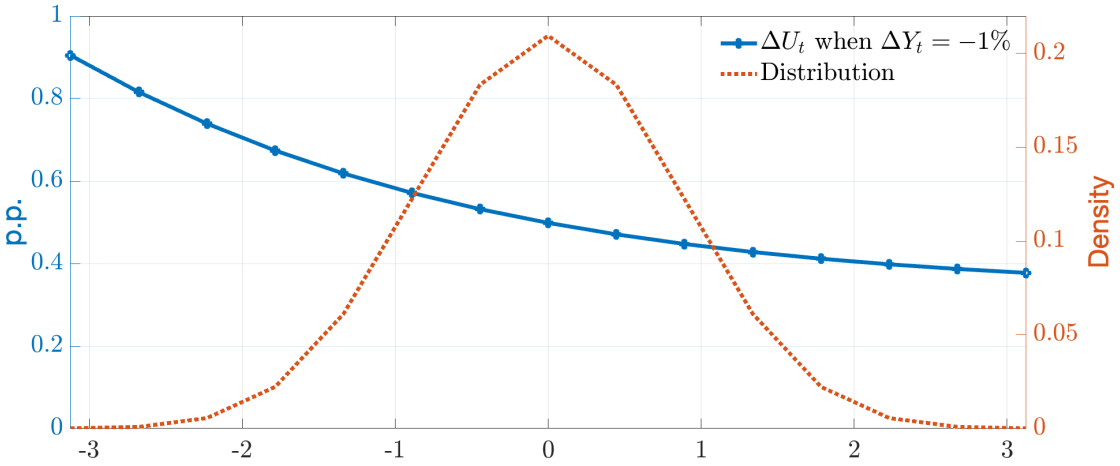

Investigating the Calibration **Household responses**

- 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

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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)

Micro labor elasticity mpc

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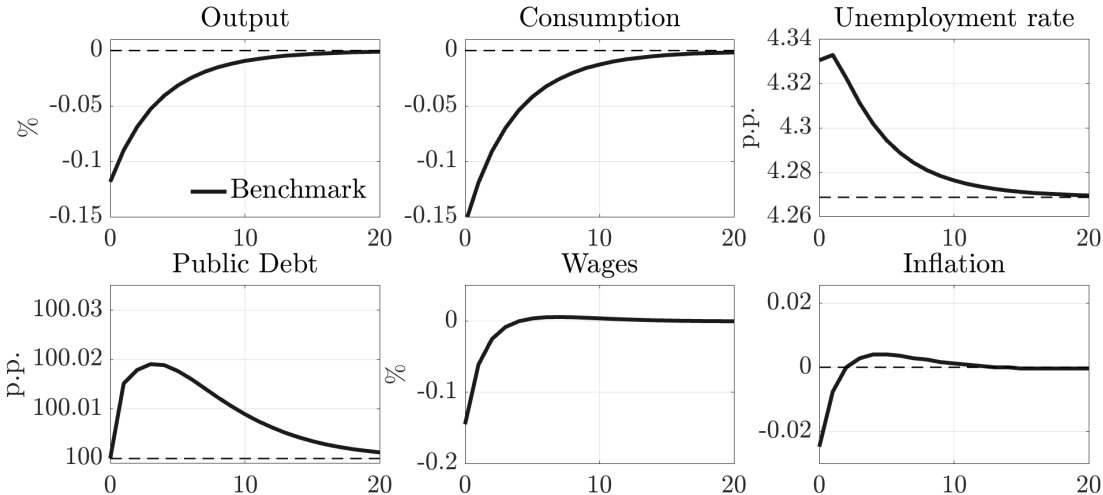
$\Rightarrow$ Conservative calibration regarding tax responses

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



Three Fiscal Stabilization Packages TT Package

- 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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    + "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 $t=0$

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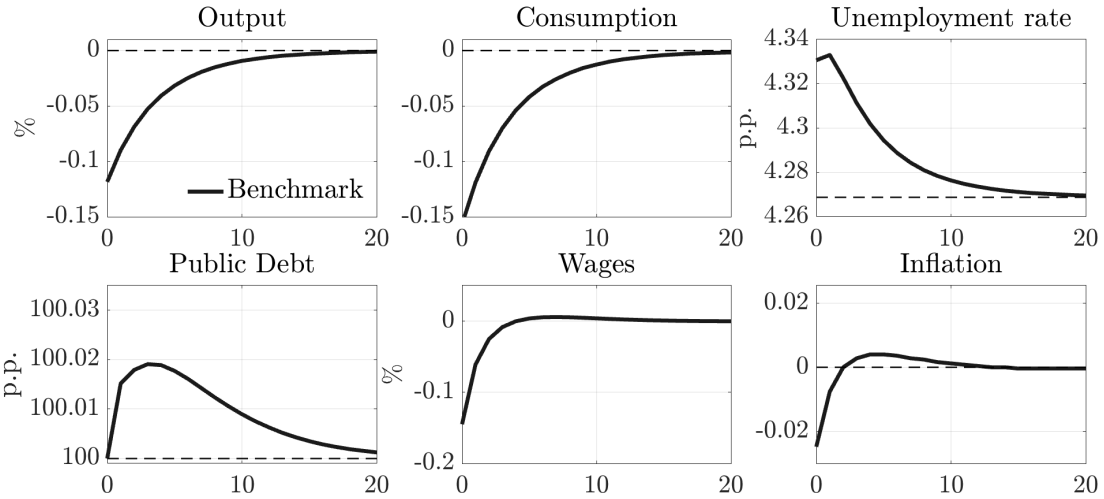
  - Calibration such that equals a one-time lump-sum check of $\$200$
    - + Initial maximum check of $\$800$, slower phase-out at $\chi = 6$

Stabilization Packages Impulse Response Functions



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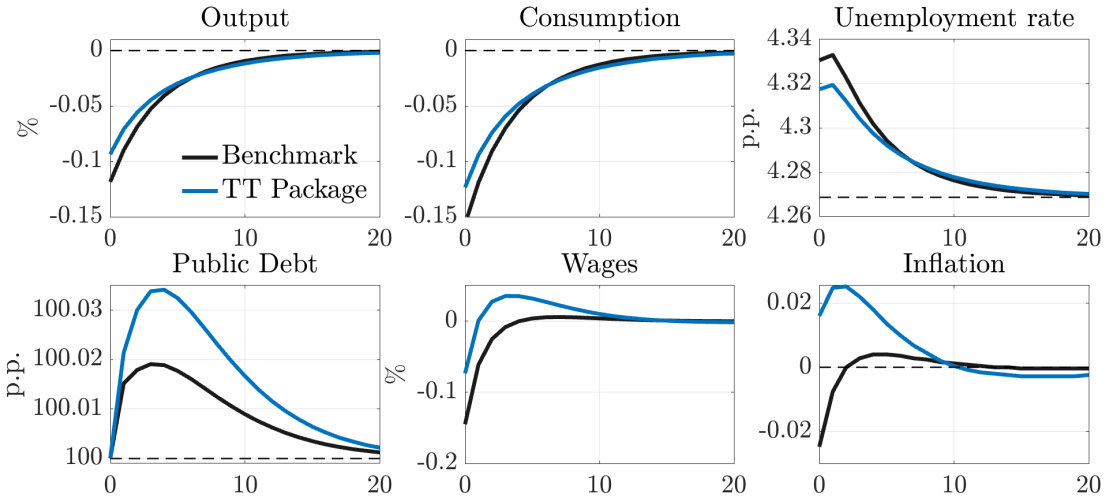

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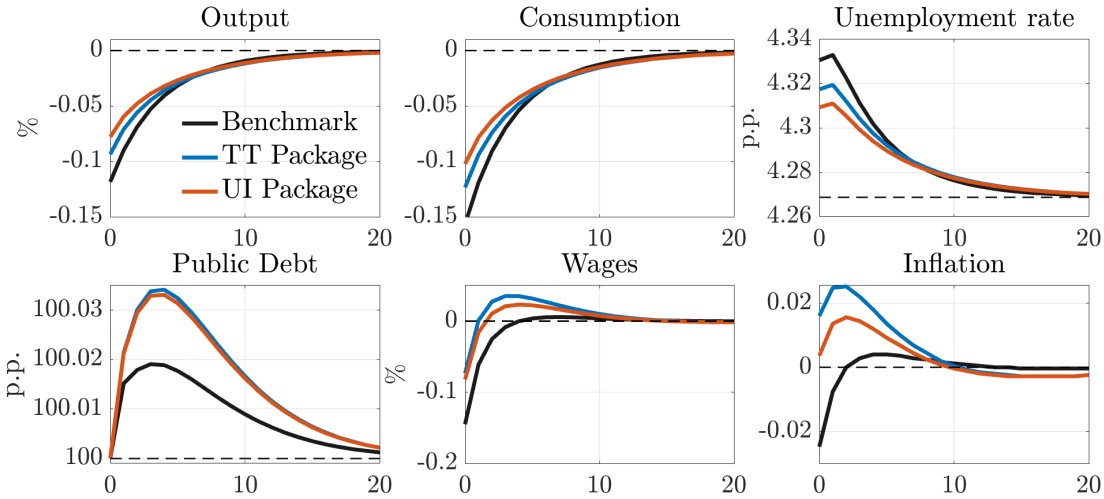

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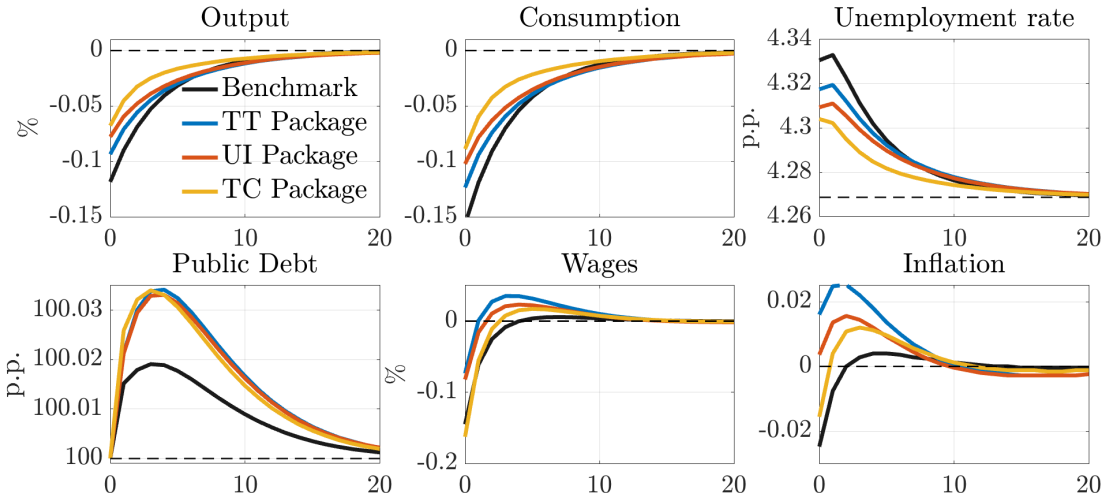
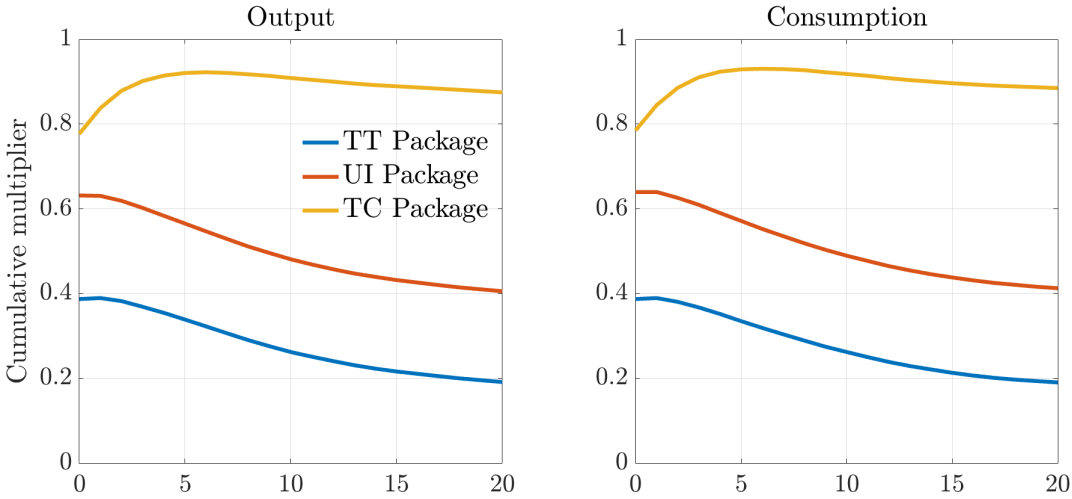


Stabilization Packages Multipliers



Deeper recession

Stabilization Packages Decomposition

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

Stabilization Packages Decomposition

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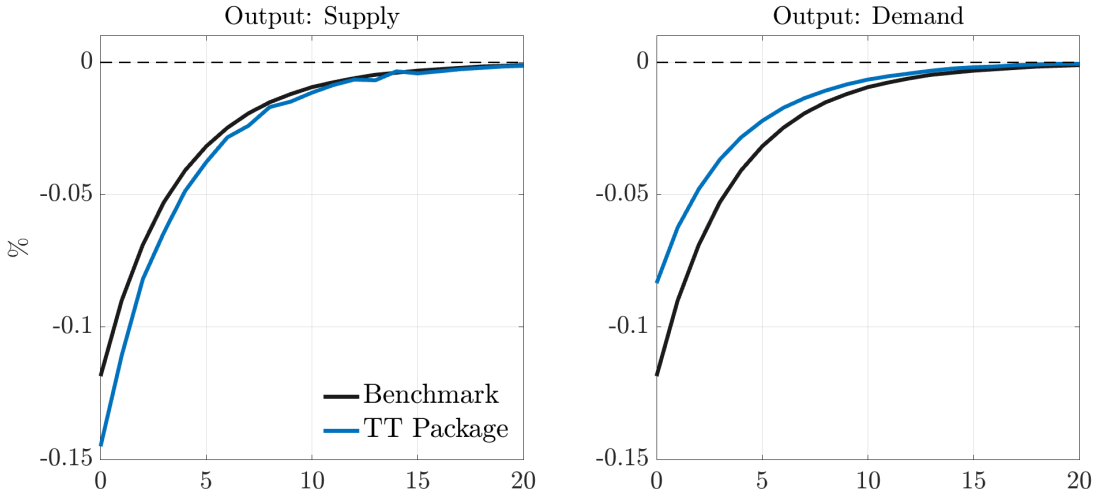
  - Use equilibrium prices and taxes and unemployment risk of the no-stabilization benchmark

$$\{r_t^b, w_t^b, \lambda_t^b, \pi_{\eta,t}^b, d_t^b\}$$

  - 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



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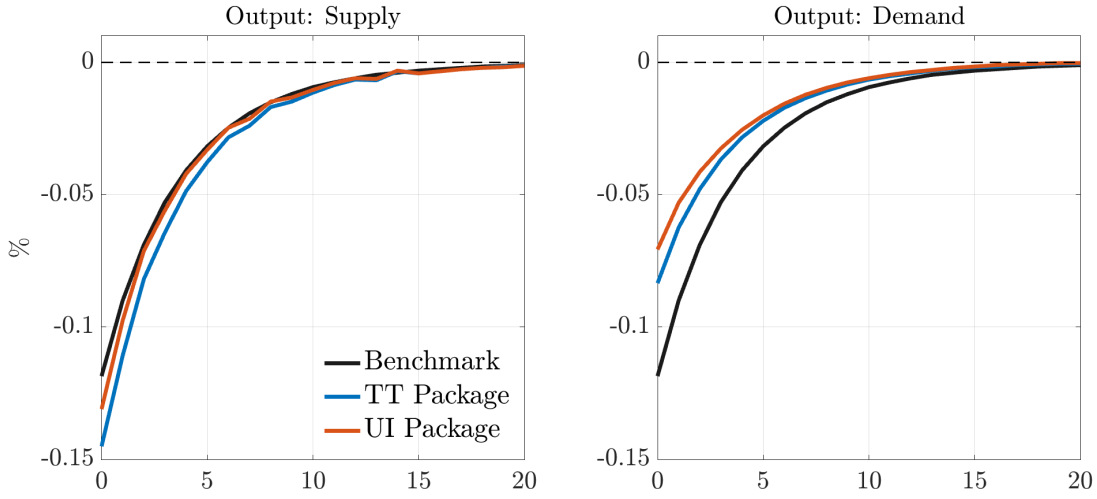
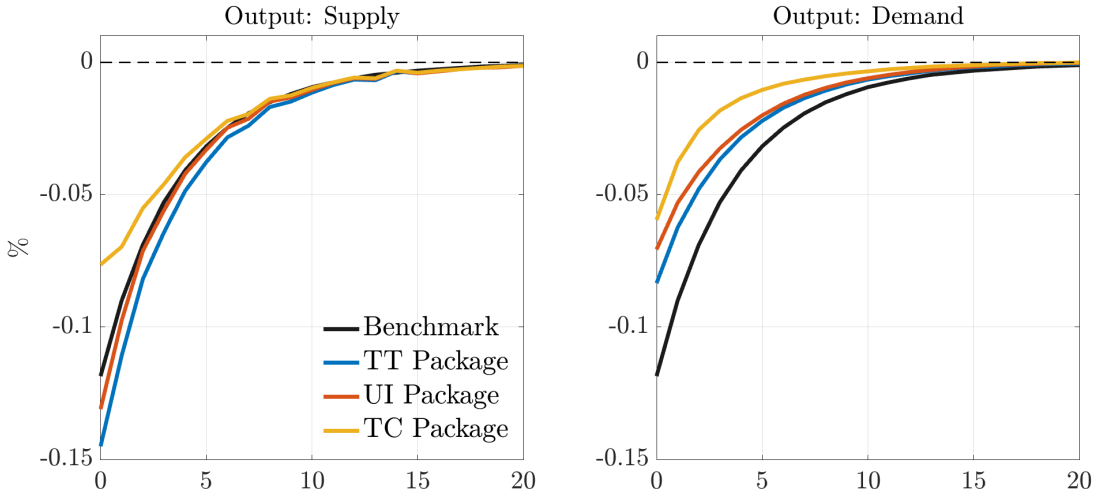


Three Fiscal Stabilization Packages **Decomposition**



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. Comparison to other packages
5. Deeper recessions
6. Steeper elasticities

Implementation

- Can we actually change taxes at business cycle frequency?

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- Arduous task, but we do
  - UI benefits were extended the GFC and the pandemic
  - Child tax credit expansion under the American Rescue Plan
  - Transfers are also commonly used

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- A systematic response of the EITC could implement the TC package

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  - UI benefits were extended the GFC and the pandemic
  - Child tax credit expansion under the American Rescue Plan
  - Transfers are also commonly used
- A systematic response of the EITC could implement the TC package
- Systematic fluctuations in payroll taxes could implement the TC package
  - Targeted to low-income
  - Easy to implement, would appear on the paycheck of workers every month

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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- 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)

Return

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

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

Return

Steady State Households

- Quarterly model calibrated to liquid wealth

Return

Steady State Households

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- Stochastic $\beta \in \{\bar{\beta} - \Delta,\ \bar{\beta},\ \bar{\beta} + \Delta\}$, duration of 50 years
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  - $\bar{\beta}$ s.t. $r \equiv 3.5\%$ annually
  - Δ s.t. top-quintile liquid wealth $\approx 90\%$ (SCF)

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

Return

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

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    $\chi = 0.15$ to match $C_u/C_e \approx 75\%$
    Kekre (2022), Gorn and Trigari (2024)
  - Automatic responses of inflation and debt: $\Phi_\Pi = 1.5$, $\Phi_D = 0.75$

Return

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)

Return

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 $c_{OK} = 0.5$

Return

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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Labor elasticities **Two approaches**

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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

Return

Steady State Unemployment

- Job finding rates and separation rates across hourly wage distribution

Return

Steady State Unemployment

- Job finding rates and separation rates across hourly wage distribution
- Job finding rates are constant in the distribution
  Mueller (2017)
  - Monthly finding rate of $0.32 \Rightarrow \pi_\eta(\ell|u) = 0.691$

Return

Steady State **Unemployment**

- Job finding rates and separation rates across hourly wage distribution

- Job finding rates are constant in the distribution
  Mueller (2017)
  - Monthly finding rate of $0.32 \Rightarrow \pi_\eta(\ell|u) = 0.691$

- Separation rates are falling in hourly wage/productivity x
  Mueller (2017)
  - 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 $\phi_1 = -0.446$

Return

Steady State **Unemployment**

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  $\Rightarrow$ $\pi_\eta(u|\ell, x) = \phi_0 x^{\phi_1}$, with $\phi_0 = 0.029$ and $\phi_1 = -0.446$
- Average unemployment rate at 4.3% with unequal incidence in the distribution

Return

Unemployment and the Business Cycle

- Okun's law type of relation between output and unemployment
  - Okun coefficient $c^{OK} = 0.5$

    Ball, Leigh, and Loungani (2017)

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  - Elasticity of job finding rates to aggregate unemployment of -0.6
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    + Homogeneous increase in job finding rates

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- Job separation rates decrease with ΔY_t
  - *Elasticity* of separation rates to aggregate unemployment larger for above-median workers
    Mueller (2017)
    + Homogeneous additive increase in separation rates

Marginal propensities to consume **Distribution x wealth**

- Marginal propensities to consume decline with wealth

Wealth quartile	1	2	3	4
mpc	0.20	0.15	0.07	0.03

Return

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

Return Return

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

Return Return

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- UI Package in the first quarter: equal to $\$2800$ per month for all unemployed
- Multipliers are similar to the baseline

Return Return

1. Role of Public Debt

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

Return

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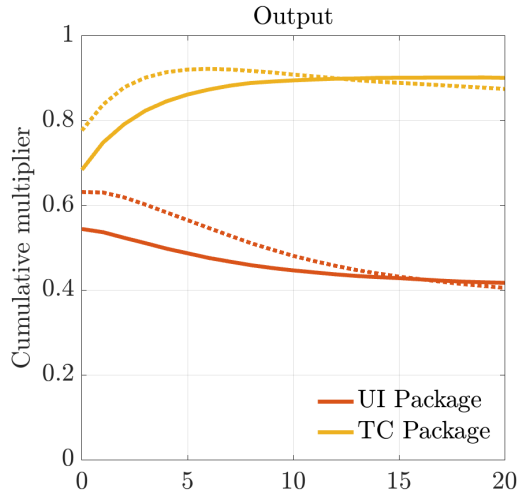
- Compute benchmark and stabilization output paths with constant debt $\Phi_D = 0$

- Public debt does help to stabilize

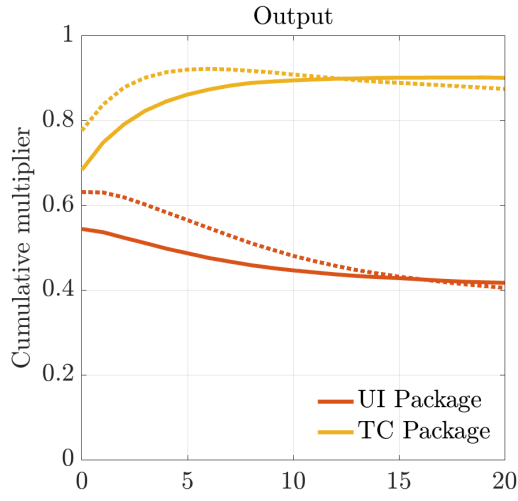


Return

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



Return

2. Distributional Effects

- Consumption by income group
  - Compare with and without stablization

Return

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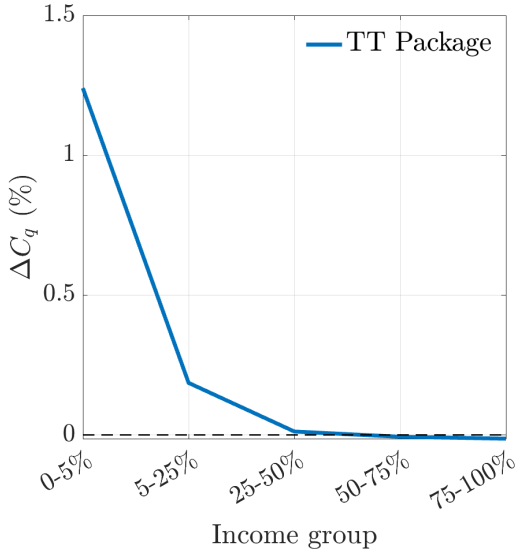
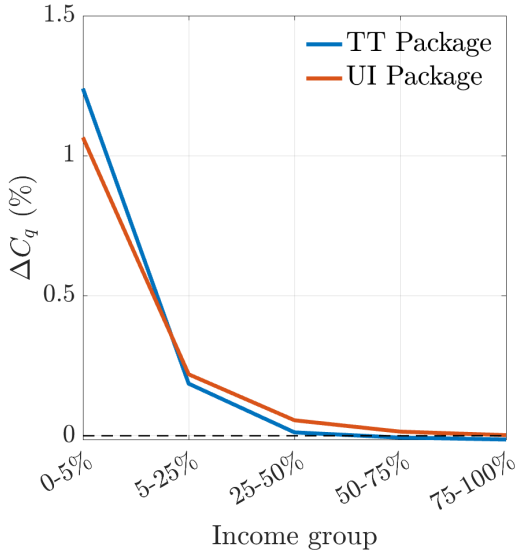
- Consumption by income group
  - Compare with and without stablization
- TT Package targets the lowest-income



Return

2. Distributional Effects

- Consumption by income group
  - Compare with and without stablization
- TT Package targets the lowest-income
  - Better than UI Package



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- TT Package targets the lowest-income
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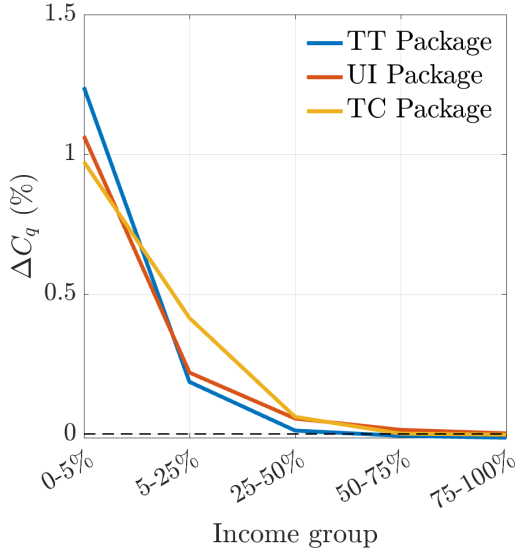
  - Better than TC Package



Return

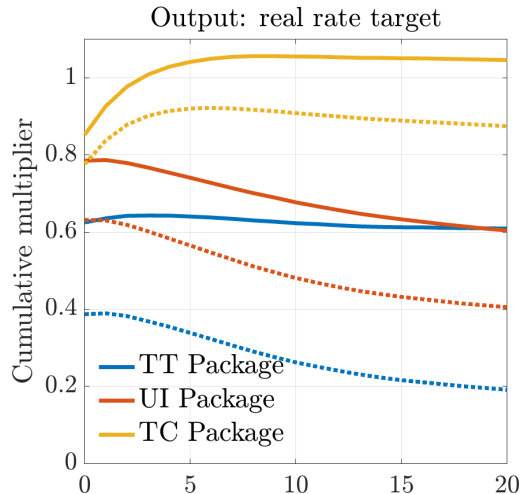
3. Monetary Policy **Identical real rate**

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

Return

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



Return

3. Monetary Policy More accommodative policy rule

- Effectiveness of fiscal packages depend on constraints on monetary policy

- Consider a richer Taylor rule:

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

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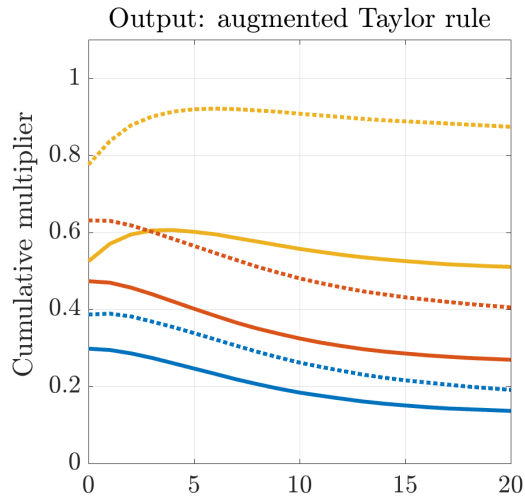
– TC package remains most effective
  – Lower multipliers than with Taylor rule

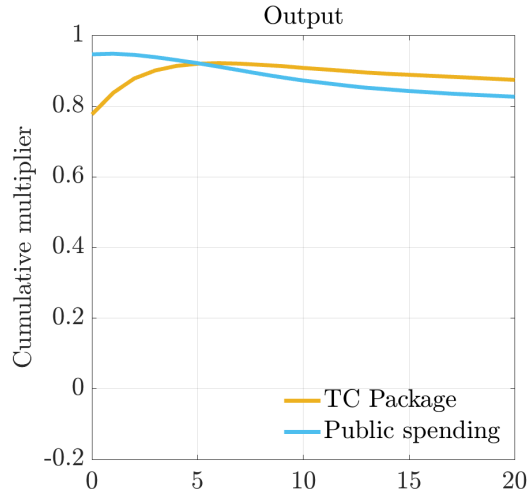


Return

4. Further Fiscal Packages G and T packages

– Public spending generates large output multiplier

  \+ . . . but negative consumption multiplier



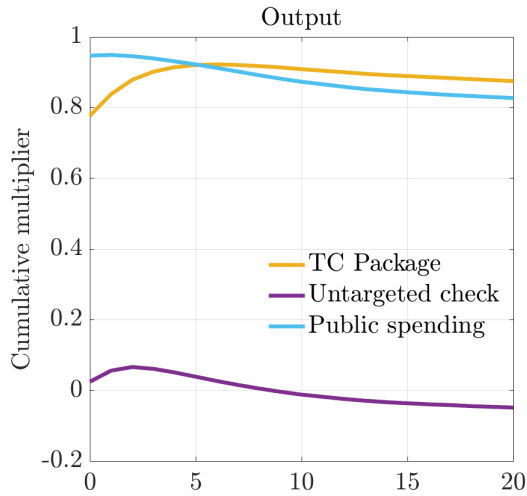
Return

4. Further Fiscal Packages G and T packages

– Public spending generates large output multiplier

  \+ . . . but negative consumption multiplier

– Lump-sum check has modest stabilization properties



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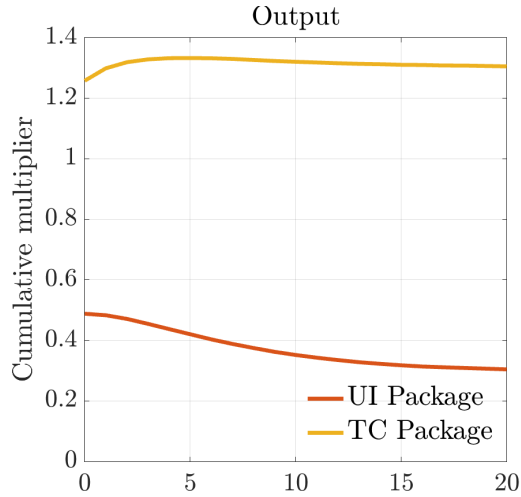
■ TC Package $\Rightarrow$ **large output** multiplier



Return

Robustness Sticky wages

- Alternative modeling of nominal rigidities with sticky wages
  Erceg, Henderson, and Levin (2000) Ferriere and Navarro (2024)
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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 $W_t = w_t P_t$

- Monopolist labor unions
  - 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

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

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

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

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

$\Rightarrow$ Implies a standard wage Philipps Curve