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

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- Design of counter-cyclical policies
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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

Fiscal Stabilization Packages

- Three fiscal stabilization packages

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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

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

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$$V_t(a, x, \ell, \beta) = \max_{c,h,a'} \{\log c - Bh + \beta \mathbb{E}_t \left[V_{t+1}(a', x', \eta', \beta') | x, \beta, \ell)\right]\} \quad \text{s.t.}$$

$$c + a' = a + y^\ell + y^k - \mathcal{T}_t(y^\ell, y^k) + T_t + d_t^h(x),$$

$$y^\ell = w_t x h, \quad y^k = r_t a, \quad h \in \{0, \bar{h}\}, \quad a' \geq 0.$$

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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)

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  - 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

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Calibration

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  - B to match employment $\approx 78\%$
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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 $\varepsilon/\Theta = 0.035$

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

Dividends

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- Job finding rates and separation rates across hourly wage distribution

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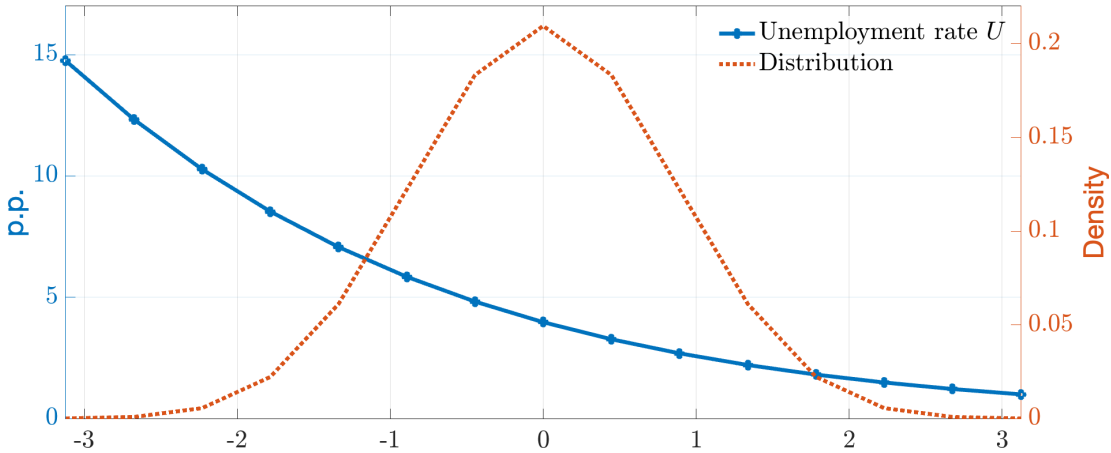
- Average unemployment rate at 4.3% with unequal incidence in the distribution

Steady State Unemployment in the Distribution



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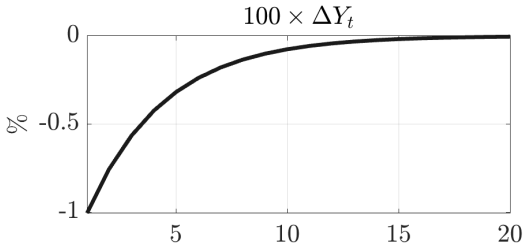
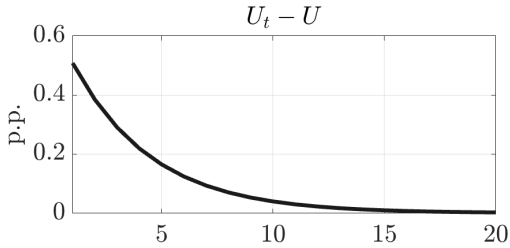
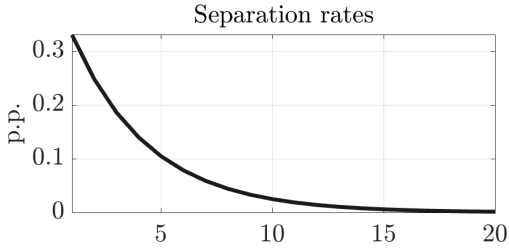
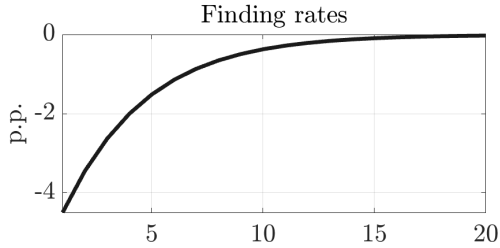
- Job separation rates decrease with ΔY_t
  - *Elasticity* of separation rates to aggregate unemployment larger for above-median workers
    Mueller (2017)
    + Homogeneous additive increase in separation rates

Unemployment and the Business Cycle Okun's law









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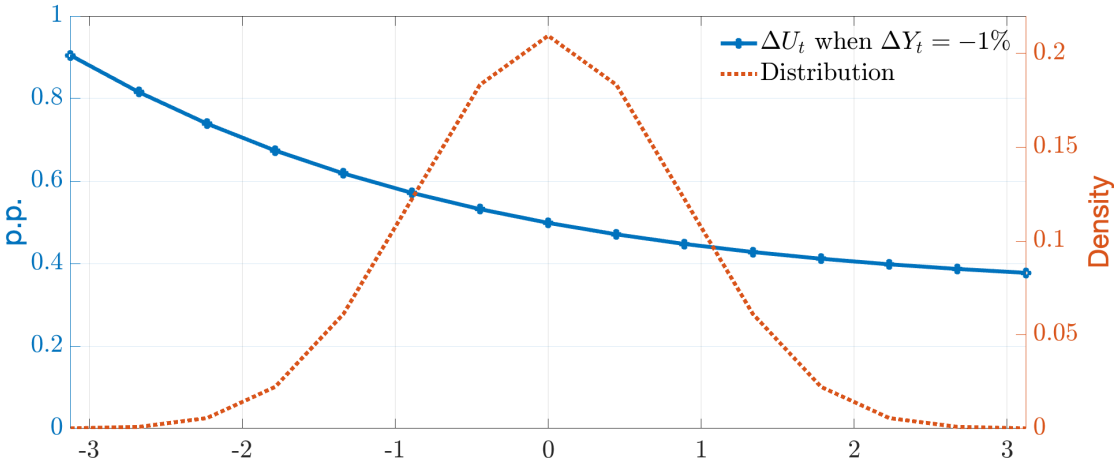

Investigating the Calibration

- 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)

Micro labor elasticity mpc

Investigating the Calibration Tax shocks

- Further investigate aggregate effects of tax shocks
- 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)
  - Tax cut on bottom-90 increases employment by 1% in the model vs. above 3% in the data
  - Tax cut on the top-10 has no effects
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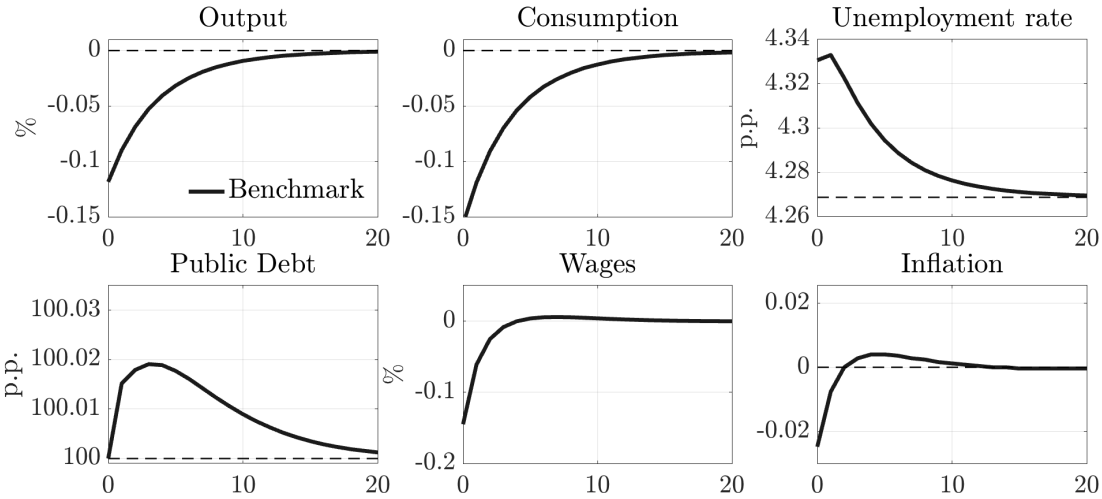
$\Rightarrow$ Conservative calibration regarding tax responses

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": $\tilde{y}(x,\eta,\beta)$

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    Ferriere, Grübener, Navarro, and Vardishvili (2023)

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

    + "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 $t=0$

Three Fiscal Stabilization Packages UI Package

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  - A check to all unemployed households, phase out with persistence ρ_ω

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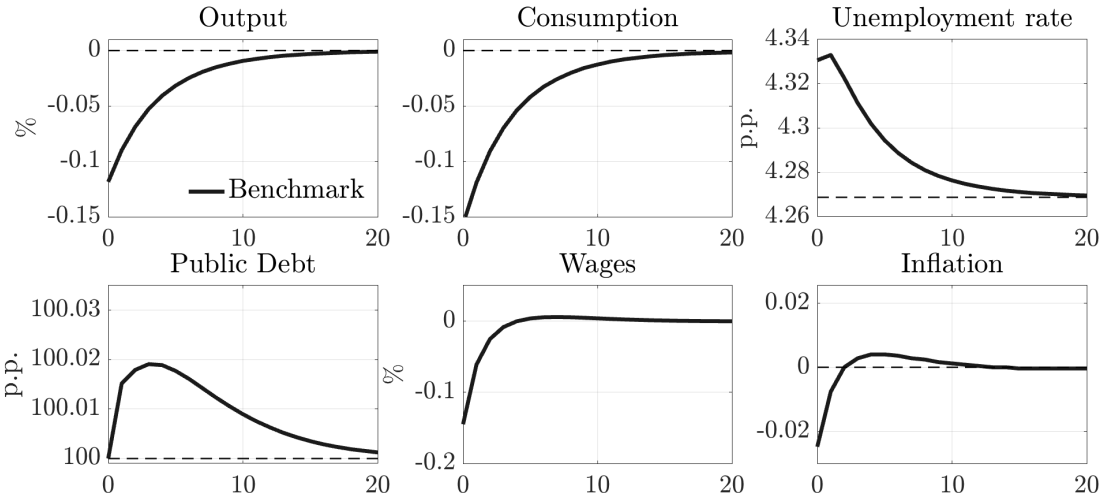
    - + Initial maximum check of $\$800$, slower phase-out at $\chi = 6$

Stabilization Packages Impulse Response Functions



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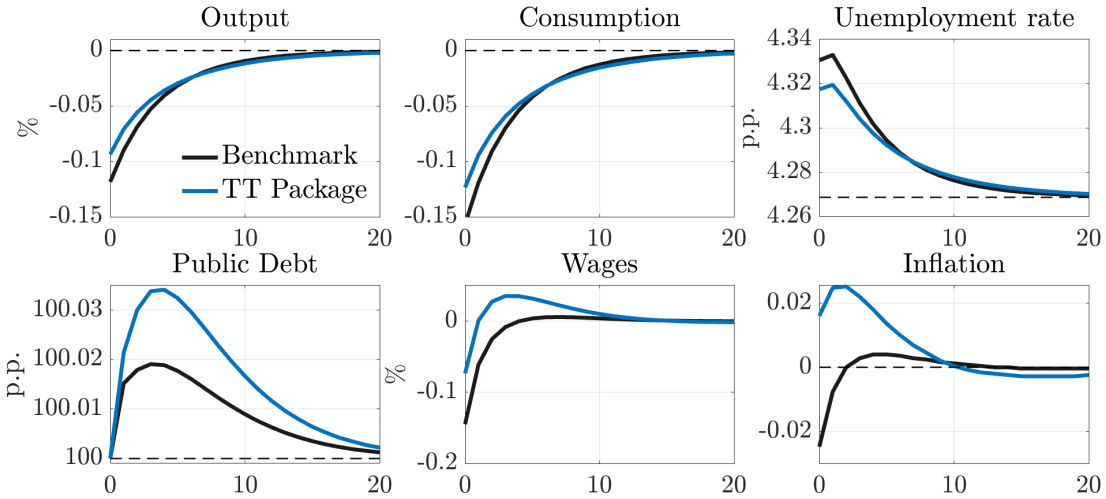

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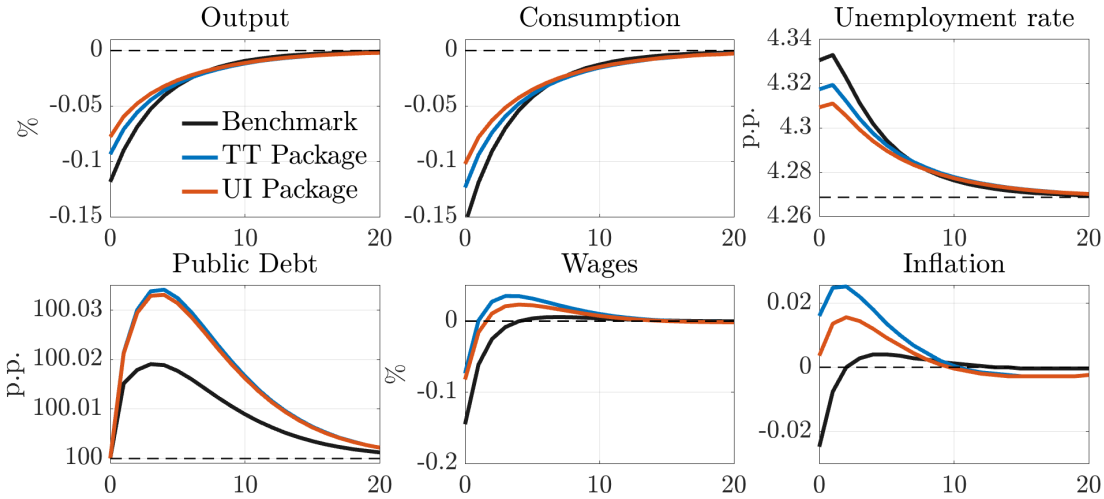

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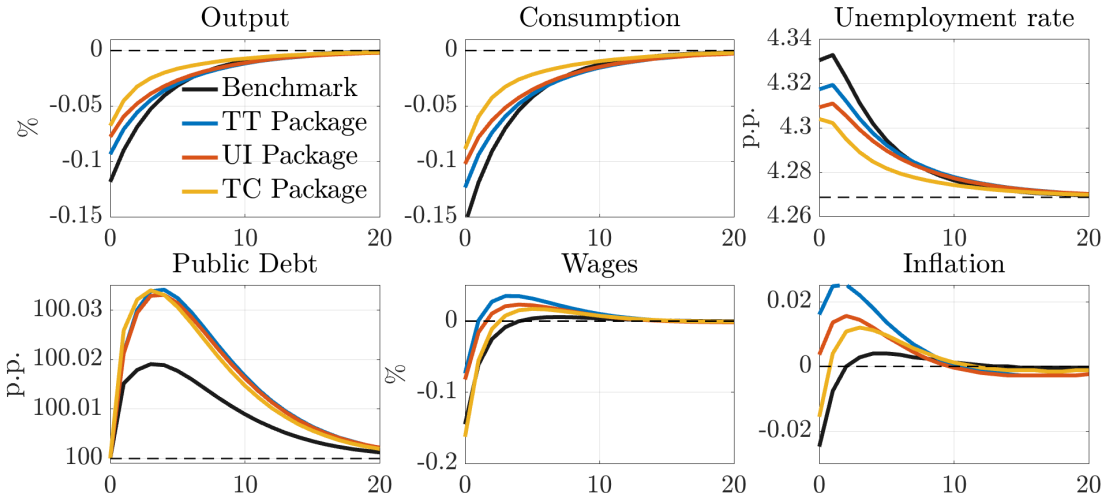
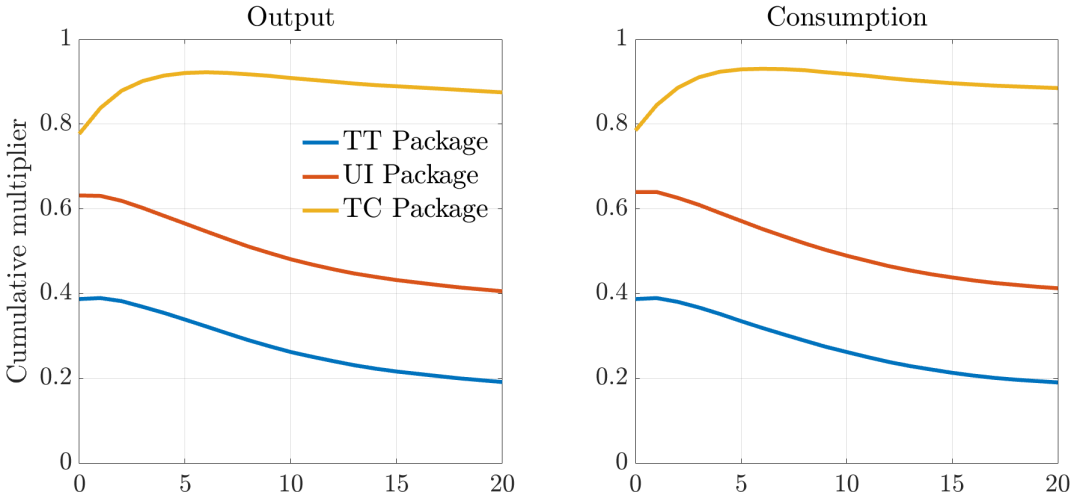


Stabilization Packages Multipliers



Deeper recession

Stabilization Packages Decomposition

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

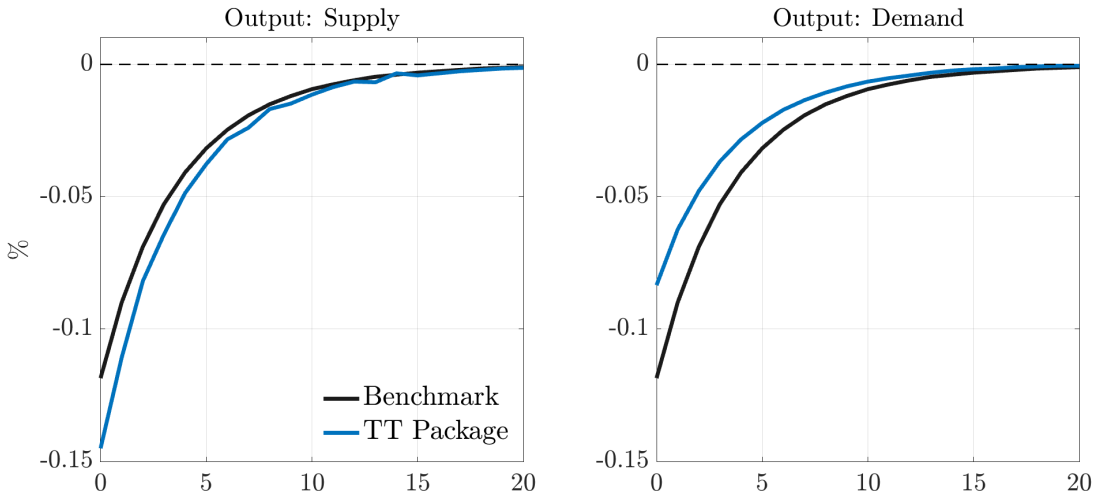
Stabilization Packages Decomposition

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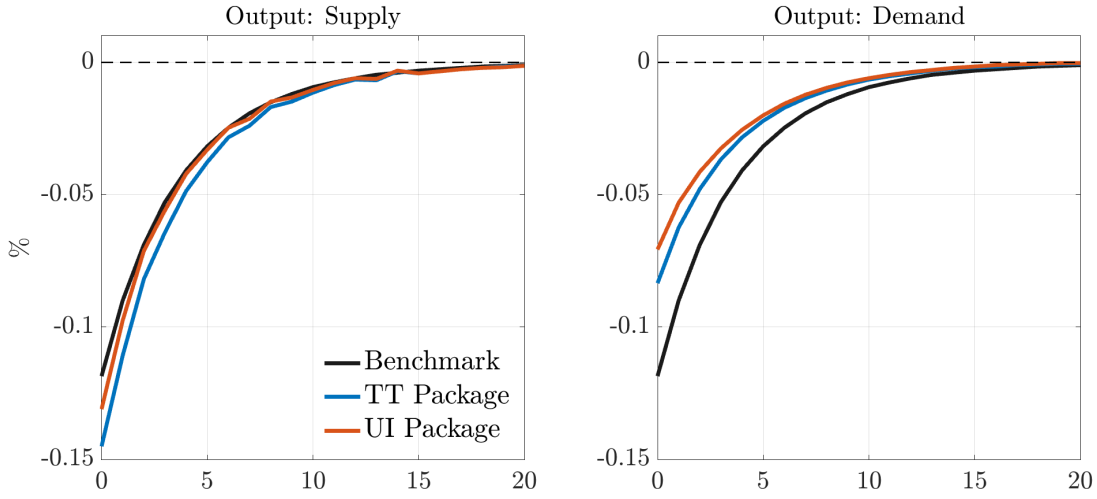

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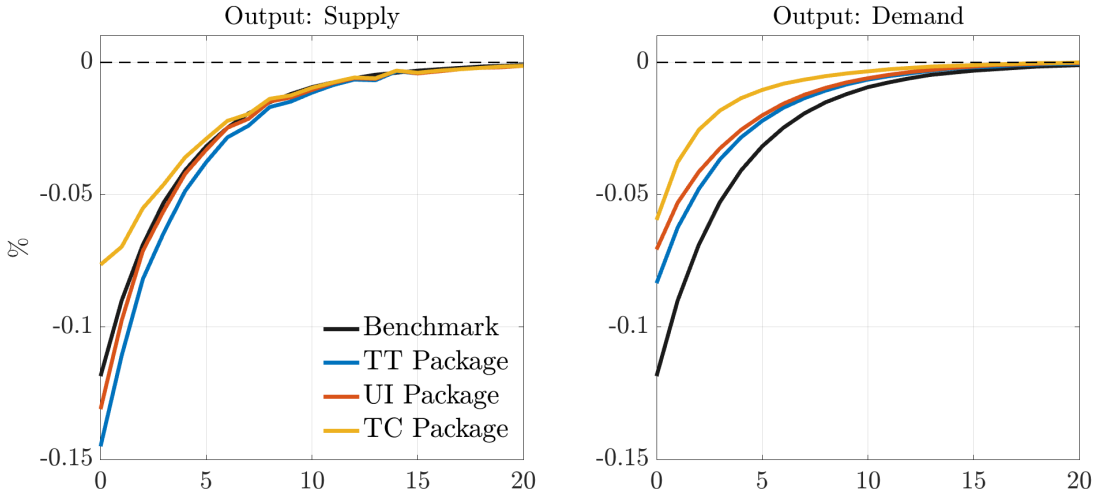

Taking Stock

- 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. Comparison to other packages
6. (Deeper recessions)
7. (Steeper elasticities)

1. Role of Public Debt

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

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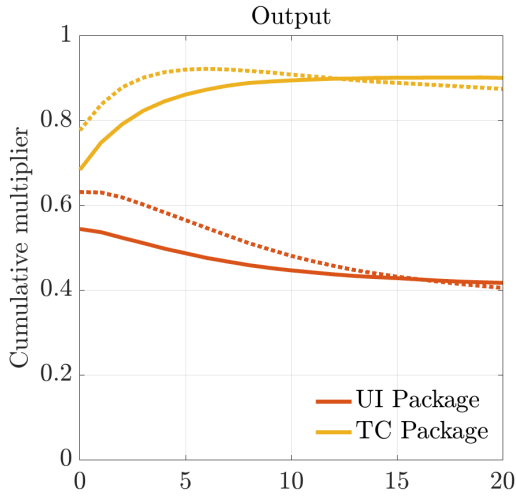

1. Role of Public Debt

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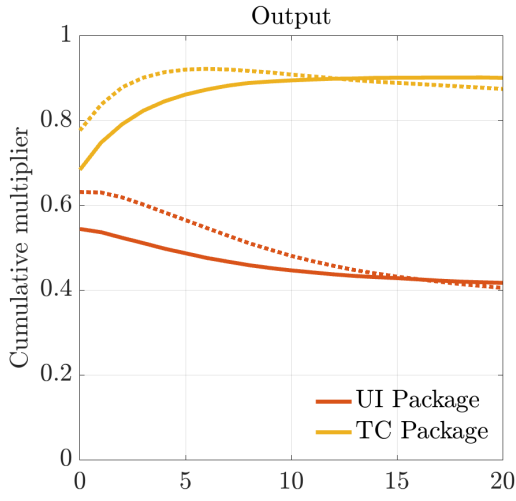
- Public debt does help to stabilize
- TC Package No Debt $\equiv$ temporary shock in labor tax progressivity

  $\Rightarrow$ Stabilizes the economy



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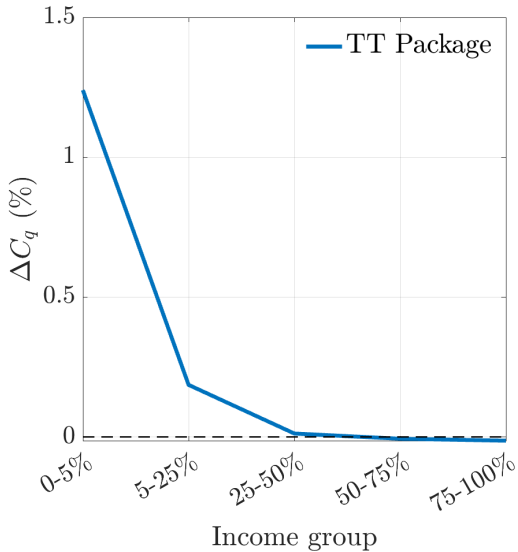

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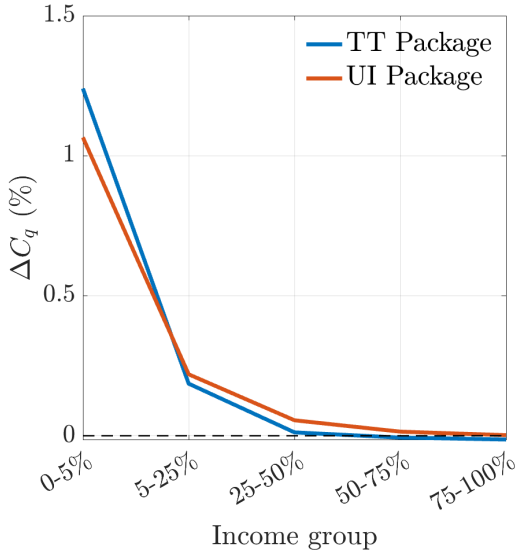
  - Better than UI Package



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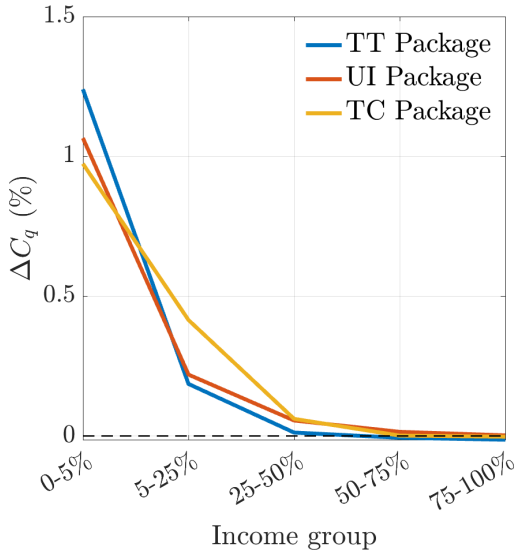

3. Monetary Policy **Identical real rate**

- Fiscal packages affect inflation differently
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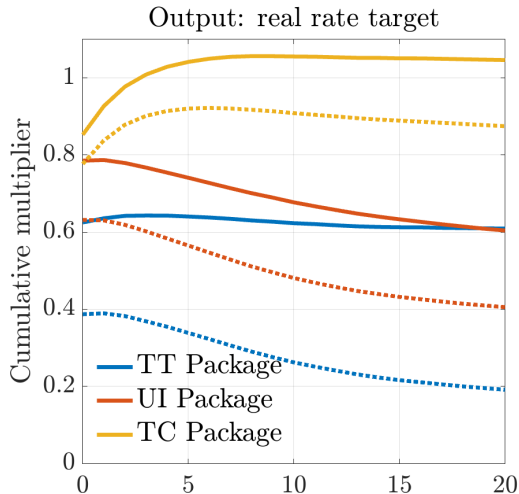
- Compare packages under benchmark real rate
- TC package remains most effective
  - Larger multipliers than with Taylor rule
  - Especially for the TT package, less for the TC package



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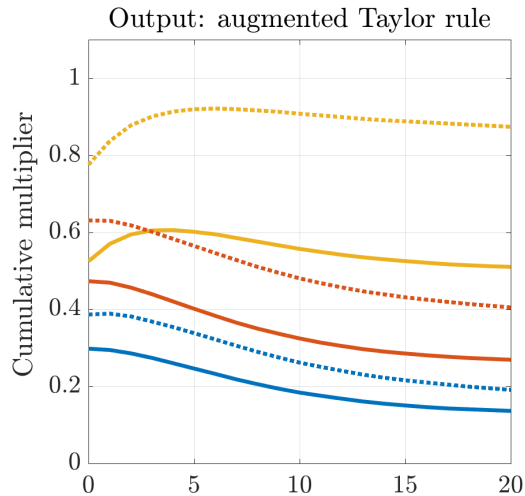
– TC package remains most effective
  – Lower multipliers than with Taylor rule



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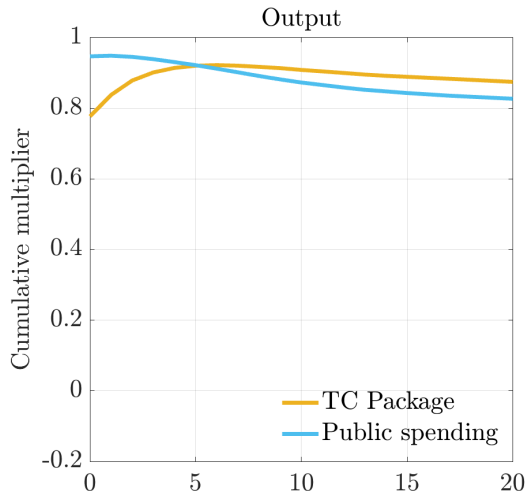
- A systematic response of the EITC could implement the TC package
- Systematic fluctuations in payroll taxes could implement the TC package
  - Easy to implement, would appear on the paycheck of workers every month

5. Further Fiscal Packages G and T packages

– Public spending generates large output multiplier

  + . . . but negative consumption multiplier



5. Further Fiscal Packages G and T packages

– Public spending generates large output multiplier

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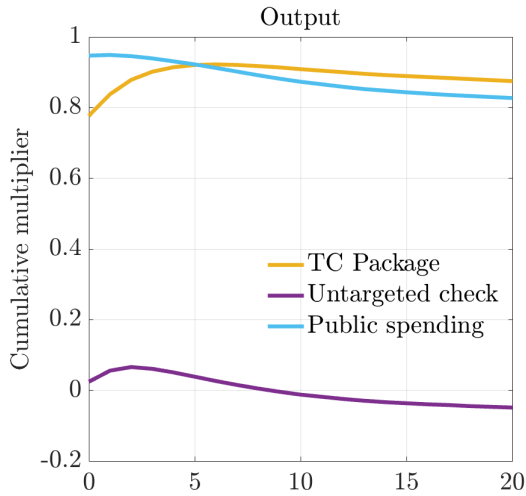
– Lump-sum check has modest stabilization properties



Conclusion

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Thank you!

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Fiscal Rule

- Public debt adjusts as a function of Φ_D

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

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

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

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- 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%
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- Multipliers are similar to the baseline

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Robustness Steeper labor elasticities

– Lower variance ρ_h to reach steeper labor elasticities

  + 0.75 at Q1 (regression), 1.1 (tax shock)

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- Closer to evidence on effects of tax shocks
  - + Tax multipliers at 1.25 (model) vs. > 2 Mertens and Ravn (2013)
  - + Bottom-90 tax cut increases employment by 2.7% (model) vs. 3% Zidar (2019)
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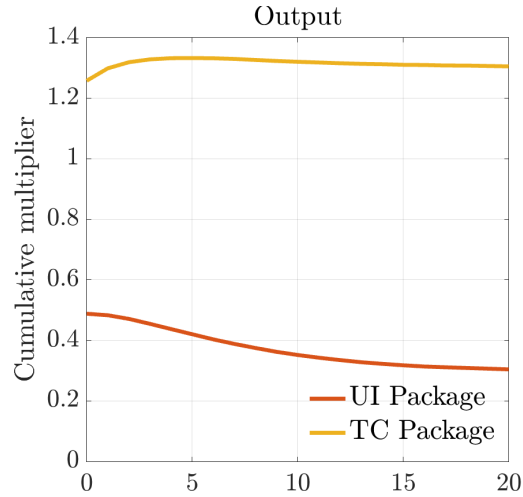
- All other targets $\approx$ identical (mpc at 0.10)

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



Return

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  Erceg, Henderson, and Levin (2000) Ferriere and Navarro (2024)
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  - 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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- 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