# Redistribution and the Monetary–Fiscal Policy Mix


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# Motivation

- Two severe post-war US contractions—the Great Recession and the COVID recession
- Fiscal policy responses included significant *transfer* components
  - The American Recovery and Reinvestment (ARRA) Act of 2009
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    - The Coronavirus Aid, Relief, and Economic Security (CARES) Act of 2020
- Revived interest in *the effectiveness of transfer policies* for macroeconomic *stabilization*
- Ongoing debates on the rapid increase in public debt and inflationary pressures
- These large-scale transfer programs eventually require *fiscal and/or monetary adjustments* to finance them

# Questions

- What are the macroeconomic effects of policies that transfer resources from unconstrained to constrained agents?
- What are the determinants of the transfer multiplier?
- What are the welfare implications of such redistribution policies?

# This Paper

- Focus on the source and role of financing of redistribution
- A transfer policy redistributes resources toward “Hand-to-mouth” households and away from “Ricardian” households that own nominal government bonds
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- Two distinct ways to finance transfers
    - Under the *monetary regime*, the government raises taxes and inflation is then stabilized in the usual way by the central bank (conventional tax financed transfers)
    - Under the *fiscal regime*, the government does not adjust taxes and the central bank allows inflation to rise to stabilize the real value of debt (inflation tax financed transfers)

# Preview of Results

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- In an analytical two-agent model show:
  - Transfer policy is inflationary in both regimes
  - It generates *greater and more persistent* inflation in the fiscal regime
- In a quantitative two-sector TANK model applied to the COVID recession and the CARES Act show:
  - Inflation-financed transfers lead to high output and consumption multipliers
  - Welfare of both household types is higher under the fiscal regime
  - Inflation-financed transfers can lead a Pareto improvement relative to no-transfer case

# Related Literature

- Fiscal-monetary interactions literature (RANK model)
  - Leeper (1991), Sims (1994), Woodford (1994), Cochrane (2001)
- Two-agent models (Monetary regime)
  - Galí, López-Salido and Vallés (2007), Bilbiie (2018)
  - Transfer multipliers in a TANK model : Bilbiie et al. (2013)
- Macroeconomic effects of the COVID crisis (Monetary regime)
  - Two-sector, two-agent model: Guerrieri, Lorenzoni, Straub and Werning (2020)
  - Effects of fiscal policy in a model with household heterogeneity: Faria-e-Castro (2021), Bayer, Born, Luetticke and Müller (2020), Kaplan, Moll and Violante (2020)
- Fiscal regime and transfers in a TANK model (No recession and financing trade-offs)
  - Bhattarai, Lee, Park and Yang (2020), Bianchi, Faccini and Melosi (2020)

# Outline

# Simple Model

- Two types of households: Ricardian (R) and Hand-To-Mouth (HTM)

- R households, of measure $1-\lambda$, choose $\{C_t^R, L_t^R, b_t^R\}$ to maximize

$$\sum_{t=0}^{\infty} \beta^t \left[ \log C_t^R - \chi \frac{\left(L_t^R\right)^{1+\varphi}}{1+\varphi} \right]$$

subject to a sequence of flow budget constraints

$$C_t^R + b_t^R = R_{t-1} \frac{1}{\Pi_t} b_{t-1}^R + w_t L_t^R + \Psi_t^R - \tau_t^R,$$

where $b_t^R = \frac{B_t^R}{P_t}$ is the real value of nominal debt and $\Pi_t = \frac{P_t}{P_{t-1}}$ is inflation

# Hand-to-Mouth (HTM) Households and Firms

- HTM households, of measure $\lambda$, consume government transfers, $s_t^H$, every period:

$$C_t^H = s_t^H.$$

- A representative firm chooses $L_t$ to maximize profits:

$$\Psi_t = Y_t - w_t L_t,$$

subject to the production function

$$Y_t = L_t.$$

# Government

- Government budget constraint (GBC) is

$$b_t = \frac{R_{t-1}}{\Pi_t} b_{t-1} - \tau_t + s_t, \tag{GBC}$$

  where $b_t = \frac{B_t}{P_t}$ is the real value of nominal debt, $s_t$ is transfers, and $\tau_t$ is taxes
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- Transfer, $s_t$, is exogenous and deterministic
- Monetary and tax policy rules are

$$\frac{R_t}{\bar{R}} = \left(\frac{\Pi_t}{\bar{\Pi}}\right)^{\phi}, \tag{Monetary policy rule}$$

$$(\tau_t - \bar{\tau}) = \psi(b_{t-1} - \bar{b}), \tag{Tax policy rule}$$

where $\phi$ and $\psi$ are feedback policy parameters that govern the regimes

# Transfer Multipliers

- $s_t > \bar{s}$ until time period $T$; $s_t = \bar{s}$ for $t \geq T+1$
- The "transfer multipliers" are independent of monetary–fiscal policy mix

$$\frac{dY(s_t)}{ds_t} = \frac{1}{1 + (1-\lambda)^{1+\varphi} \frac{\varphi}{\chi} Y_t^{-(1+\varphi)}} \in [0,1],$$

$$\frac{dC^R(s_t)}{ds_t} = \frac{1}{1-\lambda}\left[\frac{dY(s_t)}{ds_t} - 1\right] \leq 0,$$

$$\frac{dC^H(s_t)}{ds_t} = \frac{1}{\lambda}.$$

- Inflation dynamics *depend* on the monetary–fiscal policy mix

# Effects of Redistribution—Inflation

- The equilibrium path $\{\Pi_t, b_t\}$ satisfies:

$$\lim_{t\to\infty}\left[\beta^t \frac{1}{C_t^R} b_t\right] = 0, \qquad \text{(Transversality condition)}$$

$$\left(\frac{\Pi_{t+1}}{\bar{\Pi}}\right) = \frac{C_t^R}{C_{t+1}^R}\left(\frac{\Pi_t}{\bar{\Pi}}\right)^{\phi}, \qquad \text{(How } \Pi_{t+1} \text{ depends on } \Pi_t \text{ and the real rate)}$$

$$(b_t - \bar{b}) = \left[\beta^{-1}\frac{C_t^R}{C_{t-1}^R} - \psi\right](b_{t-1} - \bar{b}) + (s_t - \bar{s}) + \beta^{-1}\left[\frac{C_t^R}{C_{t-1}^R} - 1\right]\bar{b}, \qquad \text{(GBC: } t \geq 1\text{)}$$

$$(b_0 - \bar{b}) = \beta^{-1}\left(\frac{\bar{\Pi}}{\Pi_0} - 1\right)\bar{b} + (s_0 - \bar{s}). \qquad \text{(GBC: } t = 0\text{)}$$

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- How the TVC is satisfied *depends* on the fiscal policy parameter $\psi$
  - When $\psi > 0$, debt dynamics satisfies the TVC regardless of the value of $b_{T+1}$
  - When $\psi \leq 0$, the TVC requires $b_{T+1} = \bar{b}$, which can be achieved when monetary policy allows inflation to adjust by the required amount

# Effects of Redistribution—Inflation: Monetary Regime

- Under the ***monetary regime,*** $\psi > 0$ ***and*** $\phi > 1$
- Inflation for $t \geq T+1$ is

$$\Pi_t = \bar{\Pi}, \quad \forall t \geq T+1$$

- Pin down $\Pi_t$ from $t=0$ to $T$ along the *saddle path* and derive initial inflation:

$$\frac{\Pi_0}{\bar{\Pi}} = C^R\left(\bar{s}\right)^{\frac{1}{\phi^{T+1}}}\left[\frac{1}{C^R\left(s_T\right)C^R\left(s_{T-1}\right)\cdots C^R\left(s_0\right)}\right]^{\frac{1}{\phi}} = \prod_{t=0}^{T}\left[\frac{C^R\left(\bar{s}\right)}{C^R\left(s_t\right)}\right]^{\frac{1}{\phi}}$$

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- An increase in transfers is *inflationary* as $C^R\left(s_t\right)$ declines below the pre-transfer level
- The effect is *transitory*

# Effects of Redistribution—Inflation: Fiscal Regime

- Under the ***fiscal regime,*** $\psi \leq 0$ ***and*** $\phi < 1$
- A simple case: one-time transfer increase ( $s_0 > \bar{s}$ and $s_t = \bar{s}$ afterwards)

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  - One-time transitory increase in transfers has *persistent* effects on inflation

# Outline

# Quantitative Model

Model

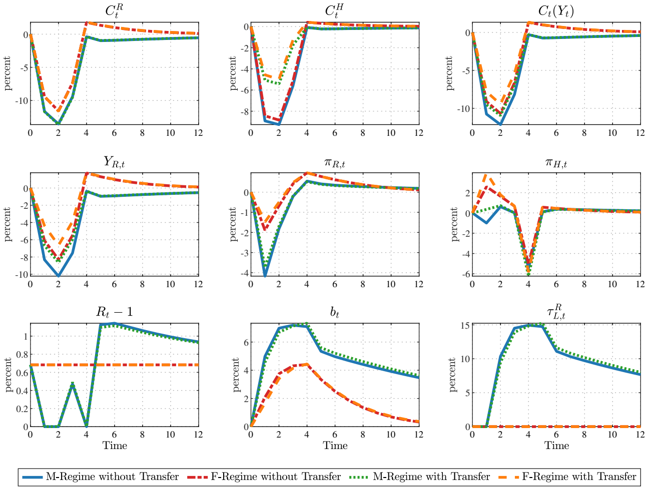
- A quantitative model with an application to the COVID recession
    - Transfer policy, as embedded in the CARES Act
- A two-sector production structure, sticky prices, and labor taxes
    - Two distinct sectors where the two types of households work
    - Sticky prices under Calvo friction
    - Distortionary labor taxes on the Ricardian household
    - Three shocks: HTM household labor supply shock; R household discount factor shock; and HTM sector demand shock
- Analyze positive and normative implications of redistribution

# Data and Calibration

Sectoral Dynamics | Calibration | Data and Model Moments

- Pick parameter values based on long-run averages or from the literature
- Calibrate the three shocks to match exactly sectoral employment and inflation dynamics during the COVID crisis in the monetary regime
- Decompose the U.S. economy into two sectors
  - HTM sector: transportation, recreation, and food service sector
  - Ricardian sector: the rest of the economy
- Calibrate the size of transfers using the CARES Act (3.4 percent of GDP)
  - One-time tax rebates and expansion of unemployment benefits
  - Transfers to state and local governments

# Redistribution Policy with Different Policy Regimes

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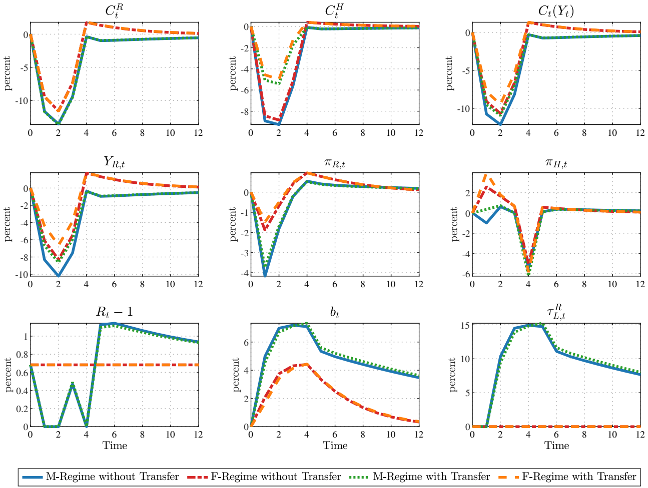


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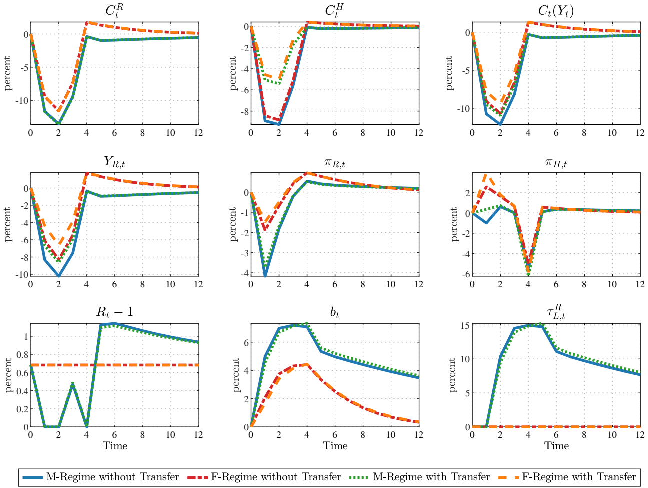


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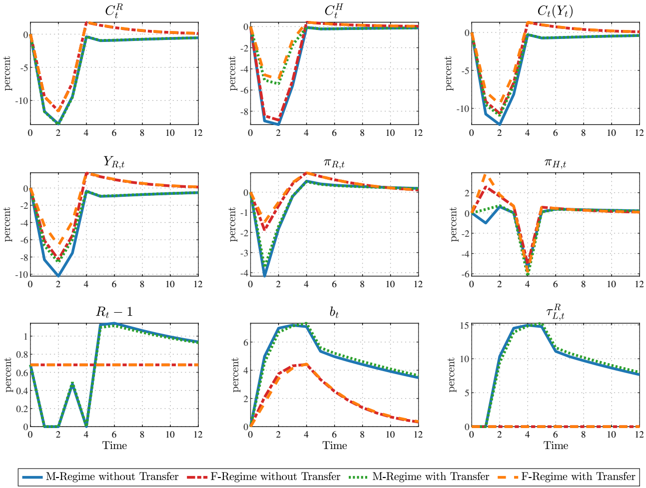


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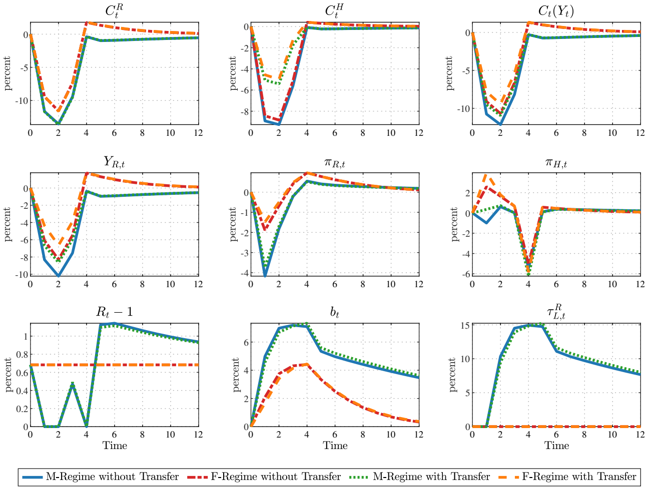


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1. Strong and persistent inflation ⇒ Large expansionary effects on output due to nominal rigidities
2. Binding ZLB leads to a bigger drop in the monetary regime
3. The redistribution program is more inflationary in the fiscal regime

# Transfer Multipliers

Definition

| | Monetary Regime | | | | Fiscal Regime | | | |
|---|---|---|---|---|---|---|---|---|
| | $\mathcal{M}_t^M(Y)$ | $\mathcal{M}_t^M(Y_R)$ | $\mathcal{M}_t^M(C^R)$ | $\mathcal{M}_t^M(C^H)$ | $\mathcal{M}_t^F(Y)$ | $\mathcal{M}_t^F(Y_R)$ | $\mathcal{M}_t^F(C^R)$ | $\mathcal{M}_t^F(C^H)$ |
| Impact Multipliers | 1.081 | 1.159 | -0.028 | 4.713 | 2.586 | 2.775 | 1.751 | 5.320 |
| 4-Year Cumulative Multipliers | 1.076 | 1.149 | -0.036 | 4.718 | 5.989 | 6.358 | 5.746 | 6.788 |

- Multipliers computed with monetary regime and no transfers as baseline
- Aggregate and Ricardian sector output multipliers both above 1 in the monetary regime due to the binding ZLB and sticky prices

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- Aggregate and Ricardian sector output multipliers both above 1 in the monetary regime due to the binding ZLB and sticky prices
- Multipliers are ***even higher in the fiscal regime***
  - $C^R$ multiplier is positive due to sticky prices and persistent inflation dynamics

# Welfare Effects of Transfer Policy

Definition Short-Run Welfare

| | Monetary Regime | | Fiscal Regime | |
|---|---|---|---|---|
| | Long-run | Short-run ($t = 4$) | Long-run | Short-run ($t = 4$) |
| Ricardian Household | -0.013 | -0.633 | 0.075 | 0.890 |
| HTM Household | 0.086 | 2.977 | 0.125 | 3.451 |

- The values are the % point deviation from the welfare of the model under monetary regime and no transfers

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- The values are the % point deviation from the welfare of the model under monetary regime and no transfers
- *Given* the redistribution program, inflation taxes (fiscal regime) produce better welfare outcomes than labor taxes (monetary regime)
- Redistribution policy under fiscal regime generates a ***Pareto improvement***

# Mechanism, Alternative Calibrations, and Sensitivity Analysis

- Mechanism
  - Decomposition of Transfer Multipliers ▸ Multipliers
  - Transfer multipliers without COVID shocks ▸ Multipliers
  - Different duration of the redistribution program ▸ M-Regime ▸ F-Regime ▸ Multipliers ▸ Welfare
- Alternative calibrations
  - Model with transfer policy ▸ Multipliers ▸ Welfare
  - Above steady-state initial debt ▸ Multipliers ▸ Welfare
- Sensitivity analysis
  - Different cross-sector elasticity of substitution ($\varepsilon = 0.8$) ▸ IRFs ▸ Multipliers
  - Different tax rule response parameter ($\psi_L = 0.1$) ▸ IRFs ▸ Multipliers
  - Exclude $600 individual tax rebates in the CARES Act (Coibion et al., 2020) ▸ Multipliers

# Conclusion

- How transfers are ultimately financed is key for their effectiveness
  - Inflation-financed transfers are significantly more effective than tax-financed transfers
  - The fiscal regime produces high and persistent inflation through the direct and the indirect (interest rate) channels
  - Quantitative exercise shows that inflation-financed transfers fight deflationary pressures in a COVID-recession-like environment
  - Such inflation-induced expansionary effects produce a Pareto improvement
- Future work
  - A richer form of heterogeneity across sectors as well as households
  - Long-term debt and effects on long-term yields

# Appendix

# Model: Ricardian Sector: Households

- Ricardian (*R*) households, of measure $1-\lambda$, solve

$$\max_{\{C_t^R, L_t^R, b_t^R\}} \sum_{t=0}^{\infty} \beta^t \exp(\eta_t^{\xi}) \left[ \frac{\left(C_t^R\right)^{1-\sigma}}{1-\sigma} - \chi \frac{\left(L_t^R\right)^{1+\varphi}}{1+\varphi} \right]$$

subject to a sequence of flow budget constraints

$$C_t^R + b_t^R = R_{t-1} \frac{1}{\Pi_t^R} b_{t-1}^R + \left(1 - \tau_{L,t}^R\right) w_t^R L_t^R + \Psi_t^R$$

- $\eta_t^{\xi}$ is a discount factor shock; $\tau_{L,t}^R$ is labor tax
- $C_t^R$ is a CES aggregator of the goods produced in the two sectors

$$C_t^R = \left[ (\alpha)^{\frac{1}{\varepsilon}} \left(C_{R,t}^R\right)^{\frac{\varepsilon-1}{\varepsilon}} + (1-\alpha)^{\frac{1}{\varepsilon}} \left(\exp(\zeta_{H,t}) C_{H,t}^R\right)^{\frac{\varepsilon-1}{\varepsilon}} \right]^{\frac{\varepsilon}{\varepsilon-1}}$$

  - $\zeta_{H,t}$ is a demand shock that is specific for *HTM* goods

# Model: HTM Sector: Households

- *HTM*-households' labor endowment is exogenous and can change with a shock
- In each period, they consume wage income and government transfers

$$C_t^H = w_t^H \overline{L^H}(1 + \eta_t^\xi) + s_t^H,$$

  where $\eta_t^\xi$ is a HTM labor supply shock

- $C_t^H$ is a CES aggregator of the goods produced in the two sectors

$$C_t^H = \left[ (1-\alpha)^{\frac{1}{\varepsilon}} \left( \exp\left(\zeta_{H,t}\right) C_{H,t}^H \right)^{\frac{\varepsilon-1}{\varepsilon}} + (\alpha)^{\frac{1}{\varepsilon}} \left( C_{R,t}^H \right)^{\frac{\varepsilon-1}{\varepsilon}} \right]^{\frac{\varepsilon}{\varepsilon-1}}$$

  - $\zeta_{H,t}$ is a demand shock that is specific for *HTM* goods

# Model: Ricardian and HTM Sector: Firms

- Monopolistically competitive firms produce varieties of the sectoral good
- Labor market is sector specific
- The production function for varieties is linear in labor
- Firms face a standard downward sloping demand curve
- Firms set prices according to the Calvo friction

# Model: Government

Back

- The government (nominal) flow budget constraint is

$$B_t + T_t^L = R_{t-1}B_{t-1} + P_t^R s_t,$$

  where $T_t^L$ is labor tax revenues

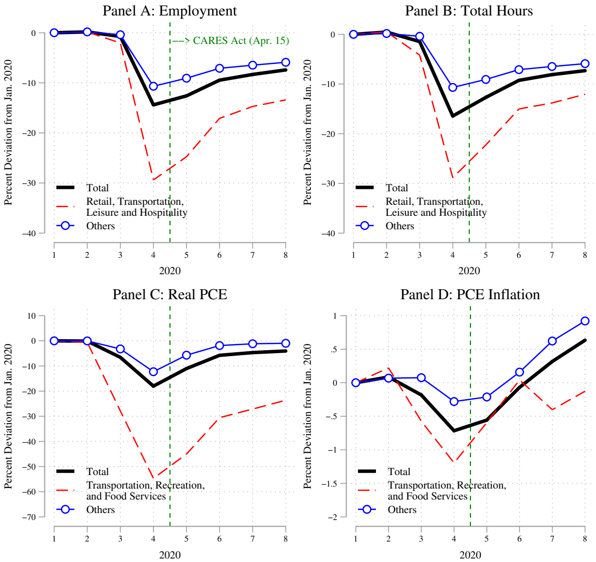
- Monetary and tax policy rules are:

$$\frac{R_t}{\bar{R}} = \max\left\{\frac{1}{\bar{R}}, \left(\frac{(1-\lambda)\,\Pi_t^R + \lambda\Pi_t^H}{\bar{\Pi}}\right)^{\phi}\right\}, \quad \tau_{L,t}^R - \bar{\tau}_L^R = \psi_L(b_{t-1} - \bar{b}).$$

  - *Monetary regime* features high enough monetary ($\phi$) and tax ($\psi_L$) rule coefficients
  - *Fiscal regime* features low enough tax ($\psi_L$) and monetary ($\phi$) rule coefficients

# Sectoral Dynamics During Covid Crisis





# Model Calibration

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| | Value | Description | Sources |
|---|---|---|---|
| Households | | | |
| $\beta$ | 0.9932 | Time preference | 2-month frequency |
| $\sigma$ | 1.7 | Inverse of EIS | Del Negro et al. (2015) |
| $\varphi$ | 2.2 | Inverse of Frisch elasticity | Del Negro et al. (2015) |
| $\chi$ | 92.9 | Labor supply disutility parameter | Steady-state $\bar{L}^R = 0.3$ |
| $\lambda$ | 0.23 | Fraction of HTM households | Employment share of HTM sectors |
| $\alpha$ | 0.72 | Consumption weight on Ricardian goods | Consumer Expenditure Surveys data |
| Firms | | | |
| $\theta$ | 6.0 | Elasticity of substitution across firms | Steady-state markup: 20% (Hall, 2018) |
| $\varepsilon$ | 2.0 | Elasticity of substitution between Ricardian and HTM goods | Assigned |
| $\omega^R$ | 0.833 | Calvo parameter for Ricardian sector | Del Negro et al. (2015) |
| $\omega^H$ | 0.0 | Calvo parameter for HTM sector | Assigned |
| Government | | | |
| $\frac{\bar{b}}{6\bar{Y}}$ | 0.509 | Steady-state debt to GDP | Data (1990Q1–2020Q1) |
| $\frac{\bar{T}^L}{\bar{Y}}$ | 0.122 | Steady-state labor tax revenue to GDP | Data (1990Q1–2020Q1) |
| $\frac{\bar{s}}{\bar{Y}}$ | 0.127 | Steady-state transfers to GDP | Data (1990Q1–2020Q1) |
| Monetary and Fiscal Policy Rules | | | |
| $\phi$ | (1.3, 0.0) | Interest rate response to inflation | Del Negro et al. (2015) |
| $\psi_L$ | (0.4, 0.0) | Labor tax rate response to debt | Assigned |
| Shocks | | | |
| $\eta_t^H$ | (-17%, -19%, -13%) | Size of HTM labor supply shock | Total hours for HTM sectors |
| $\eta_t^\xi$ | (-20%, -24%, -15%) | Size of discount factor shock | Total hours excluding HTM sectors |
| $\zeta_{H,t}$ | (-1.9%, 0.8%, 3.5%) | Size of HTM sector demand shock | PCE Inflation for HTM sectors |
| $s_t$ | (8.9%, 8.9%, 8.9%) | Size of transfer distribution | 2020 CARES Act |

# Data and Model Moments

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| | Time | Data | Model |
|---|---|---|---|
| ***Panel A: Targeted moments (percent deviation from January)*** | | | |
| Total Hours for retail, transportation, leisure/hospitality | April | -16.7% | -16.7% |
| | June | -18.8% | -18.8% |
| | August | -13.2% | -13.2% |
| Total Hours excluding retail, transportation, leisure/hospitality | April | -6.58% | -6.58% |
| | June | -8.57% | -8.57% |
| | August | -6.13% | -6.13% |
| PCE Inflation for recreation, transportation, food services | April | -0.99% | -0.99% |
| | June | -0.39% | -0.39% |
| | August | -0.37% | -0.37% |
| ***Panel B: Non-targeted moments (percent deviation from January)*** | | | |
| PCE Inflation excluding recreation, transportation, food services | April | -0.14% | -4.17% |
| | June | -0.06% | -1.82% |
| | August | 0.74% | -0.21% |
| Real PCE for recreation, transportation, food services | April | -41.1% | -16.7% |
| | June | -37.6% | -18.8% |
| | August | -25.2% | -13.2% |
| Real PCE excluding recreation, transportation, food services | April | -7.74% | -8.32% |
| | June | -3.78% | -10.2% |
| | August | -1.06% | -7.54% |
| Real PCE | April | -12.2% | -10.8% |
| | June | -8.34% | -12.1% |
| | August | -4.31% | -8.16% |

# Definition: Transfer Multipliers

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- The transfer multiplier for output under regime $i \in \{M, F\}$ is defined as

$$\mathcal{M}_t^i(Y) = \left( \frac{\sum_{h=0}^{t} \beta^h (\tilde{Y}_h^i - Y_h^M)}{\sum_{h=0}^{t} \beta^h s_h} \right),$$

  where $\tilde{Y}_h^i$ is output at horizon $h$ under $i$-regime *with* transfers, $Y_h^M$ is output at horizon $h$ under the monetary regime *without* transfers, and $s_h$ is transfers at horizon $h$

# Definition: Welfare Gains

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- We define our measure of welfare gain for household of type $i \in \{R, H\}$ , $\mu^i_{t,k}$, as

$$\sum_{j=0}^{t} \beta^j U\left(C^i_j, L^i_j\right) = \sum_{j=0}^{t} \beta^j U\left(\left(1+\mu^i_{t,k}\right)\bar{C}^i, \bar{L}^i\right),$$

  where $\left\{\bar{C}^i, \bar{L}^i\right\}$ is the steady-state level of type-$i$ household's consumption and hours, and $\{C^i_j, L^i_j\}$ are the time path of type-$i$ household's consumption and hours
- The values in the table are the % point deviation from the welfare of the baseline model under the monetary regime without transfers.

# Short-Run Welfare Gains Comparison

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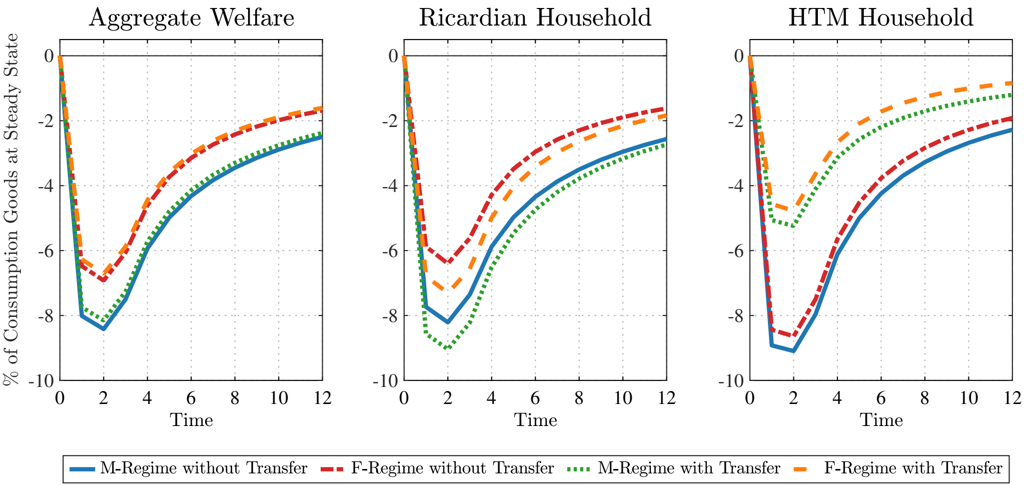

# Inspecting the Mechanisms of Transfer Multipliers

The output multiplier under regime $i \in \{M, F\}$ can be decomposed as:

$$\mathcal{M}_t^i(Y) = \underbrace{\left(\frac{\sum_{h=0}^{t} \beta^h (\tilde{Y}_h^i - \tilde{Y}_{\text{no shock},h}^i)}{\sum_{h=0}^{t} \beta^h s_h}\right)}_{\text{COVID Effect with Transfer}} + \underbrace{\left(\frac{\sum_{h=0}^{t} \beta^h (\tilde{Y}_{\text{no shock},h}^i - \bar{Y})}{\sum_{h=0}^{t} \beta^h s_h}\right)}_{\text{Transfer Effect without COVID Shocks}} - \underbrace{\left(\frac{\sum_{h=0}^{t} \beta^h (Y_h^M - \bar{Y})}{\sum_{h=0}^{t} \beta^h s_h}\right)}_{\text{COVID Effect without Transfer}}$$

- The third effect is the same across regimes, while the first two are different as they compute the effect for a given regime.

# Decomposition of Transfer Multipliers

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| | Monetary Regime | | | | Fiscal Regime | | | |
|---|---|---|---|---|---|---|---|---|
| | $\mathcal{M}_t^M(Y)$ | $\mathcal{M}_t^M(Y_R)$ | $\mathcal{M}_t^M(C^R)$ | $\mathcal{M}_t^M(C^H)$ | $\mathcal{M}_t^F(Y)$ | $\mathcal{M}_t^F(Y_R)$ | $\mathcal{M}_t^F(C^R)$ | $\mathcal{M}_t^F(C^H)$ |
| *Panel A: Impact Multipliers* | | | | | | | | |
| Total Effect | 1.081 | 1.159 | -0.028 | 4.713 | 2.586 | 2.775 | 1.751 | 5.320 |
| COVID Effect with Transfer | -9.138 | -5.542 | -8.630 | -10.799 | -7.941 | -4.251 | -7.213 | -10.323 |
| Transfer Effect without COVID | 0.805 | 0.851 | -0.359 | 4.616 | 1.113 | 1.177 | 0.003 | 4.746 |
| COVID Effect without Transfer | -9.414 | -5.850 | -8.961 | -10.896 | -9.414 | -5.85 | -8.961 | -10.896 |
| *Panel B: 4-Year Cumulative Multipliers* | | | | | | | | |
| Total Effect | 1.076 | 1.149 | -0.036 | 4.718 | 5.989 | 6.358 | 5.746 | 6.788 |
| COVID Effect with Transfer | -10.844 | -7.979 | -10.96 | -10.467 | -6.219 | -3.075 | -5.517 | -8.520 |
| Transfer Effect without COVID | 0.721 | 0.762 | -0.458 | 4.580 | 1.009 | 1.067 | -0.119 | 4.702 |
| COVID Effect without Transfer | -11.200 | -8.366 | -11.382 | -10.605 | -11.200 | -8.366 | -11.382 | -10.605 |

# Transfer Multipliers without COVID Shocks

Back

| | Monetary Regime | | | | Fiscal Regime | | | |
|---|---|---|---|---|---|---|---|---|
| | $\mathcal{M}_t^M(Y)$ | $\mathcal{M}_t^M(Y_R)$ | $\mathcal{M}_t^M(C^R)$ | $\mathcal{M}_t^M(C^H)$ | $\mathcal{M}_t^F(Y)$ | $\mathcal{M}_t^F(Y_R)$ | $\mathcal{M}_t^F(C^R)$ | $\mathcal{M}_t^F(C^H)$ |
| *Panel A: Without COVID shocks under sticky price* | | | | | | | | |
| Impact Multipliers | 0.805 | 0.851 | -0.359 | 4.616 | 1.113 | 1.177 | 0.003 | 4.746 |
| 2-Year Cumulative Multipliers | 0.803 | 0.849 | -0.362 | 4.615 | 1.014 | 1.072 | -0.113 | 4.704 |
| 4-Year Cumulative Multipliers | 0.721 | 0.762 | -0.458 | 4.580 | 1.009 | 1.067 | -0.119 | 4.702 |
| *Panel B: Without COVID shocks under flexible price* | | | | | | | | |
| Impact Multipliers | 0.476 | 0.504 | -0.745 | 4.476 | 0.476 | 0.504 | -0.745 | 4.476 |
| 2-Year Cumulative Multipliers | 0.179 | 0.189 | -1.095 | 4.349 | 0.476 | 0.504 | -0.745 | 4.476 |
| 4-Year Cumulative Multipliers | -0.043 | -0.045 | -1.356 | 4.255 | 0.476 | 0.504 | -0.745 | 4.476 |
| *Panel C: Without COVID shocks under flexible price and lump-sum tax adjustment* | | | | | | | | |
| Impact Multipliers | 0.476 | 0.504 | -0.745 | 4.476 | 0.476 | 0.504 | -0.745 | 4.476 |
| 2-Year Cumulative Multipliers | 0.476 | 0.504 | -0.745 | 4.476 | 0.476 | 0.504 | -0.745 | 4.476 |
| 4-Year Cumulative Multipliers | 0.476 | 0.504 | -0.745 | 4.476 | 0.476 | 0.504 | -0.745 | 4.476 |

# Monetary Regime: Different Duration of Redistribution Policy

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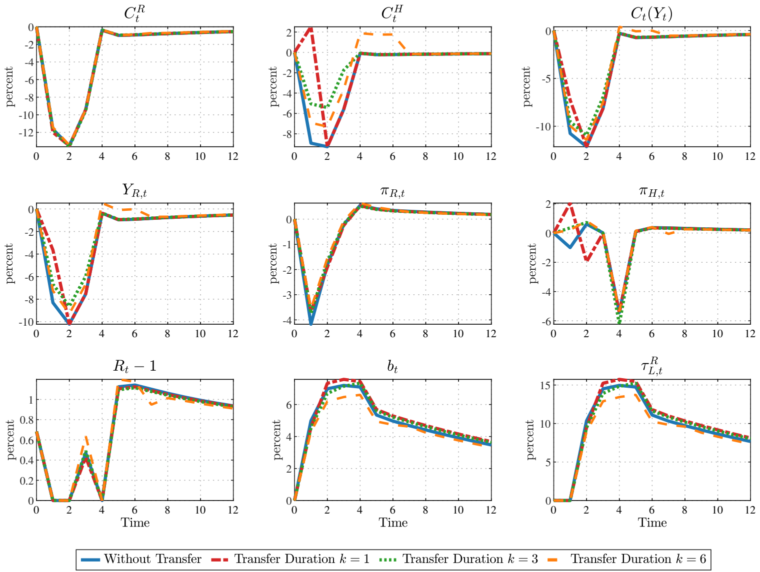
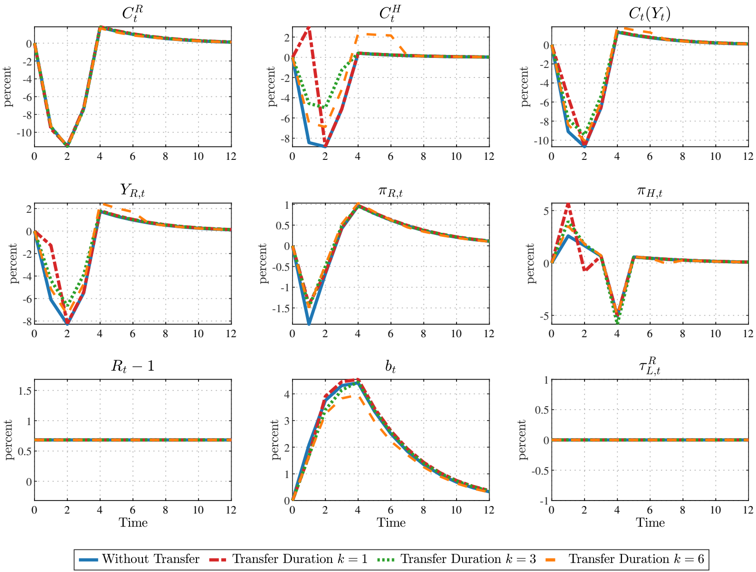


# Fiscal Regime: Different Duration of Redistribution Policy





# Multipliers with Different Transfer Distribution

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| | Monetary Regime | | | Fiscal Regime | | |
|---|---|---|---|---|---|---|
| Transfer Duration | $k = 1$ | $k = 3$ | $k = 6$ | $k = 1$ | $k = 3$ | $k = 6$ |
| *Panel A: Impact multiplier* | | | | | | |
| $\mathcal{M}_{24}^{i}(Y)$ | 1.027 | 1.081 | 1.380 | 1.545 | 2.586 | 4.115 |
| $\mathcal{M}_{24}^{i}(Y_R)$ | 1.103 | 1.159 | 1.478 | 1.661 | 2.775 | 4.415 |
| $\mathcal{M}_{24}^{i}(C^R)$ | -0.092 | -0.028 | 0.324 | 0.521 | 1.751 | 3.557 |
| $\mathcal{M}_{24}^{i}(C^H)$ | 4.688 | 4.713 | 4.835 | 4.895 | 5.320 | 5.941 |
| *Panel B: 4-year cumulative multiplier* | | | | | | |
| $\mathcal{M}_{24}^{i}(Y)$ | 1.010 | 1.076 | 1.348 | 6.020 | 5.989 | 5.844 |
| $\mathcal{M}_{24}^{i}(Y_R)$ | 1.085 | 1.149 | 1.431 | 6.397 | 6.358 | 6.198 |
| $\mathcal{M}_{24}^{i}(C^R)$ | -0.112 | -0.036 | 0.282 | 5.784 | 5.746 | 5.572 |
| $\mathcal{M}_{24}^{i}(C^H)$ | 4.681 | 4.718 | 4.840 | 6.792 | 6.788 | 6.734 |

# Long-run Welfare with Different Transfer Distribution

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| | Monetary Regime | | | Fiscal Regime | | |
|---|---|---|---|---|---|---|
| Transfer Duration | $k = 1$ | $k = 3$ | $k = 6$ | $k = 1$ | $k = 3$ | $k = 6$ |
| Ricardian Household | -0.016 | -0.013 | -0.007 | 0.074 | 0.075 | 0.071 |
| HTM Household | 0.082 | 0.086 | 0.085 | 0.121 | 0.125 | 0.120 |

# Transfer Multipliers (Model with Transfer Policy)

Back

| | Monetary Regime | | | | Fiscal Regime | | | |
|---|---|---|---|---|---|---|---|---|
| | $\mathcal{M}_t^M(Y)$ | $\mathcal{M}_t^M(Y_R)$ | $\mathcal{M}_t^M(C^R)$ | $\mathcal{M}_t^M(C^H)$ | $\mathcal{M}_t^F(Y)$ | $\mathcal{M}_t^F(Y_R)$ | $\mathcal{M}_t^F(C^R)$ | $\mathcal{M}_t^F(C^H)$ |
| Impact Multipliers | 1.077 | 1.151 | -0.035 | 4.716 | 2.896 | 3.099 | 2.113 | 5.457 |
| 2-Year Cumulative Multipliers | 1.090 | 1.159 | -0.022 | 4.728 | 6.043 | 6.409 | 5.807 | 6.817 |
| 4-Year Cumulative Multipliers | 1.083 | 1.152 | -0.030 | 4.725 | 7.034 | 7.456 | 6.971 | 7.240 |

# Transfer Multipliers (Above Steady-State Debt)

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| | Monetary Regime | | | | Fiscal Regime | | | |
|---|---|---|---|---|---|---|---|---|
| | $\mathcal{M}_t^M(Y)$ | $\mathcal{M}_t^M(Y_R)$ | $\mathcal{M}_t^M(C^R)$ | $\mathcal{M}_t^M(C^H)$ | $\mathcal{M}_t^F(Y)$ | $\mathcal{M}_t^F(Y_R)$ | $\mathcal{M}_t^F(C^R)$ | $\mathcal{M}_t^F(C^H)$ |
| Impact Multipliers | 1.211 | 1.303 | 0.127 | 4.759 | 4.260 | 4.597 | 3.739 | 5.965 |
| 2-Year Cumulative Multipliers | 1.336 | 1.430 | 0.272 | 4.819 | 8.283 | 8.824 | 8.458 | 7.710 |
| 4-Year Cumulative Multipliers | 1.403 | 1.501 | 0.351 | 4.848 | 9.656 | 10.274 | 10.072 | 8.296 |

# Welfare with Under Alternative Calibrations

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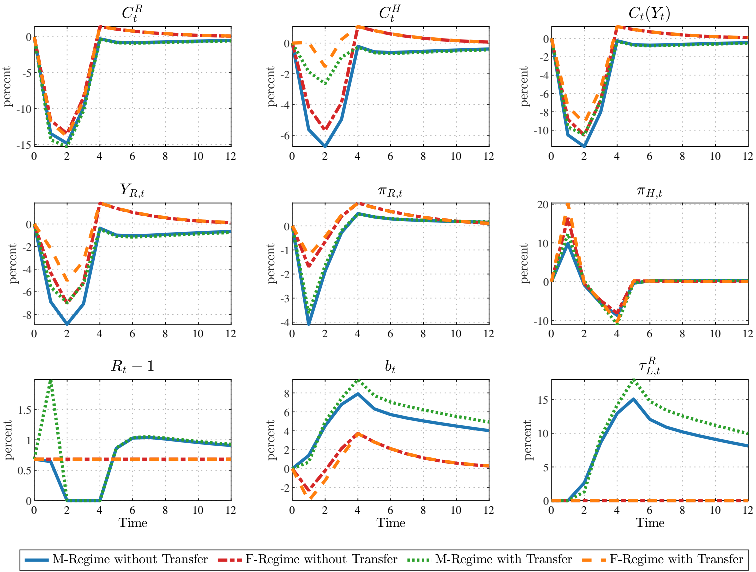
| Transfer Distribution | Monetary Regime | | Fiscal Regime | |
|---|---|---|---|---|
| | Long-run | Short-run ($t = 4$) | Long-run | Short-run ($t = 4$) |
| *Panel A: Alternative calibration with transfer policy* | | | | |
| Ricardian Household | -0.011 | -0.598 | 0.105 | 1.393 |
| HTM Household | 0.087 | 2.982 | 0.134 | 3.559 |
| *Panel B: Alternative calibration with above steady state initial debt* | | | | |
| Ricardian Household | -0.009 | -0.578 | 0.057 | 1.053 |
| HTM Household | 0.090 | 3.021 | 0.155 | 3.900 |

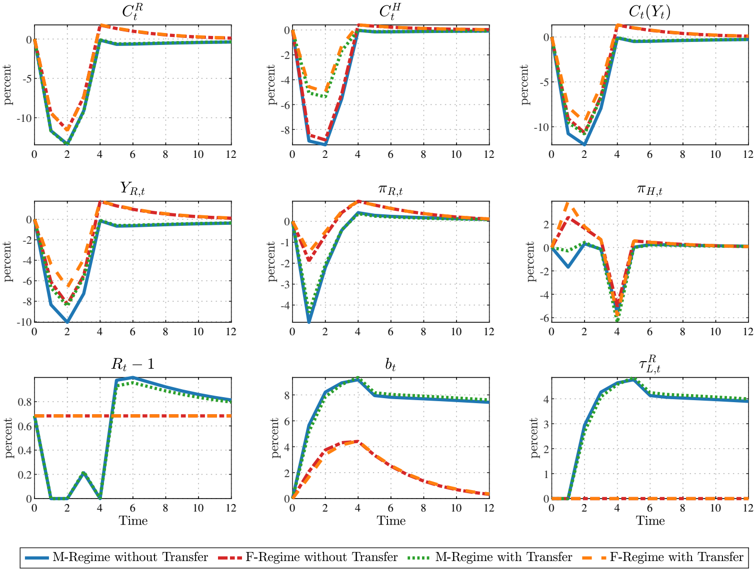
# Redistribution Policy with Different Policy Regimes ($\varepsilon = 0.8$)

Back



# Redistribution Policy with Different Policy Regimes ($\psi_L = 0.1$)

Back



# Transfer Multipliers: Sensitivity Analysis

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| | Monetary Regime | | | | Fiscal Regime | | | |
|---|---|---|---|---|---|---|---|---|
| | $\mathcal{M}_t^M(Y)$ | $\mathcal{M}_t^M(Y_R)$ | $\mathcal{M}_t^M(C^R)$ | $\mathcal{M}_t^M(C^H)$ | $\mathcal{M}_t^F(Y)$ | $\mathcal{M}_t^F(Y_R)$ | $\mathcal{M}_t^F(C^R)$ | $\mathcal{M}_t^F(C^H)$ |
| *Panel A: Transfer Multipliers ($k = 3$, $\varepsilon = 0.8$)* | | | | | | | | |
| Impact Multipliers | 0.769 | 0.945 | -0.625 | 5.332 | 2.719 | 3.365 | 1.098 | 8.026 |
| 2-Year Cumulative Multipliers | 0.805 | 0.982 | -0.592 | 5.378 | 5.167 | 6.153 | 3.299 | 11.281 |
| 4-Year Cumulative Multipliers | 0.644 | 0.795 | -0.736 | 5.162 | 6.111 | 7.253 | 4.144 | 12.549 |
| *Panel B: Transfer Multipliers ($k = 3$, $\psi_L = 0.1$)* | | | | | | | | |
| Impact Multipliers | 1.092 | 1.170 | -0.016 | 4.717 | 2.598 | 2.788 | 1.765 | 5.325 |
| 2-Year Cumulative Multipliers | 1.135 | 1.211 | 0.033 | 4.742 | 4.637 | 4.929 | 4.156 | 6.211 |
| 4-Year Cumulative Multipliers | 1.145 | 1.221 | 0.044 | 4.746 | 5.301 | 5.630 | 4.936 | 6.494 |

# Transfer Multipliers (Excluding $600 Individual Tax Rebates)

Back

| | Monetary Regime | | | | Fiscal Regime | | | |
|---|---|---|---|---|---|---|---|---|
| | $\mathcal{M}_t^M(Y)$ | $\mathcal{M}_t^M(Y_R)$ | $\mathcal{M}_t^M(C^R)$ | $\mathcal{M}_t^M(C^H)$ | $\mathcal{M}_t^F(Y)$ | $\mathcal{M}_t^F(Y_R)$ | $\mathcal{M}_t^F(C^R)$ | $\mathcal{M}_t^F(C^H)$ |
| *Panel A: Impact Multipliers* | | | | | | | | |
| Total Effect | 1.081 | 1.158 | -0.029 | 4.713 | 3.613 | 3.877 | 2.964 | 5.738 |
| COVID Effect with Transfer | -15.793 | -9.677 | -14.965 | -18.502 | -13.57 | -7.286 | -12.336 | -17.61 |
| Transfer Effect without COVID | 0.803 | 0.849 | -0.362 | 4.615 | 1.113 | 1.177 | 0.003 | 4.747 |
| COVID Effect without Transfer | -16.070 | -9.986 | -15.297 | -18.600 | -16.070 | -9.986 | -15.297 | -18.600 |
| *Panel B: 4-Year Cumulative Multipliers* | | | | | | | | |
| Total Effect | 1.077 | 1.148 | -0.036 | 4.718 | 9.406 | 9.977 | 9.765 | 8.230 |
| COVID Effect with Transfer | -18.764 | -13.895 | -19.008 | -17.965 | -10.727 | -5.375 | -9.550 | -14.577 |
| Transfer Effect without COVID | 0.722 | 0.763 | -0.457 | 4.581 | 1.014 | 1.071 | -0.114 | 4.705 |
| COVID Effect without Transfer | -19.118 | -14.28 | -19.429 | -18.102 | -19.118 | -14.28 | -19.429 | -18.102 |