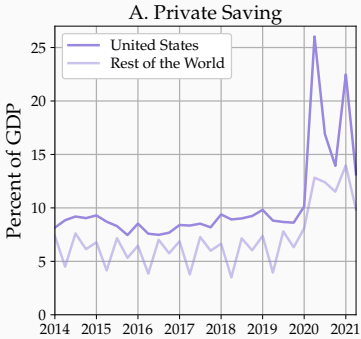
Excess Savings and Twin Deficits: The Transmission of Fiscal Stimulus in Open Economies

Rishabh Aggarwal, Adrien Auclert, Matthew Rognlie, and Ludwig Straub

European Central Bank, April 2022

Three facts about the world economy since the beginning of the pandemic



- **Fact 1**: large increase in private savings around the world, esp. in the U.S.

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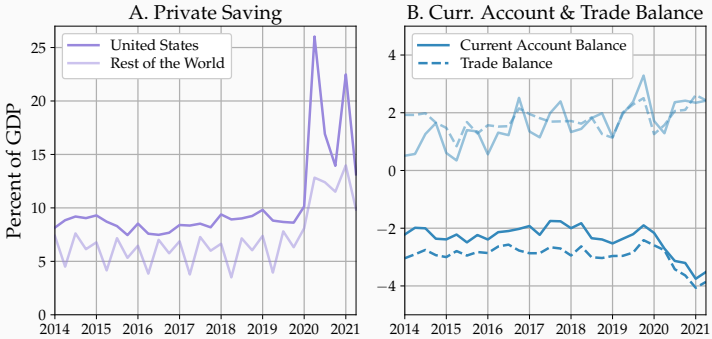

- **Fact 2**: recent increase in the current account and trade deficits in the U.S.

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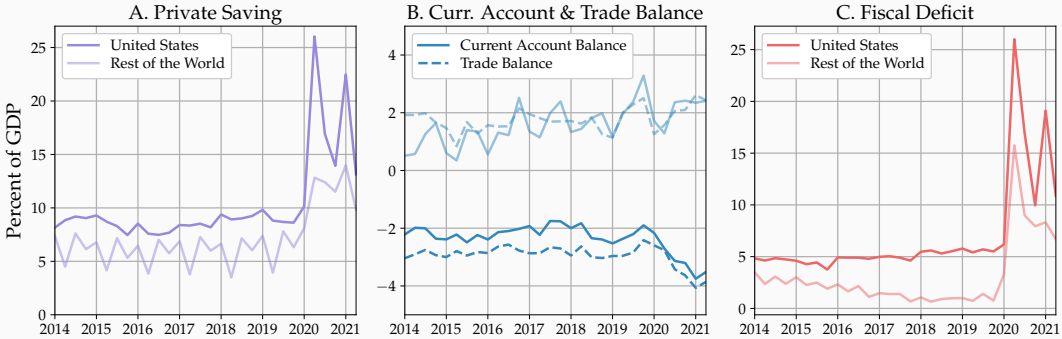

- **Fact 3**: large increase in fiscal deficits around the world, esp. in the U.S.

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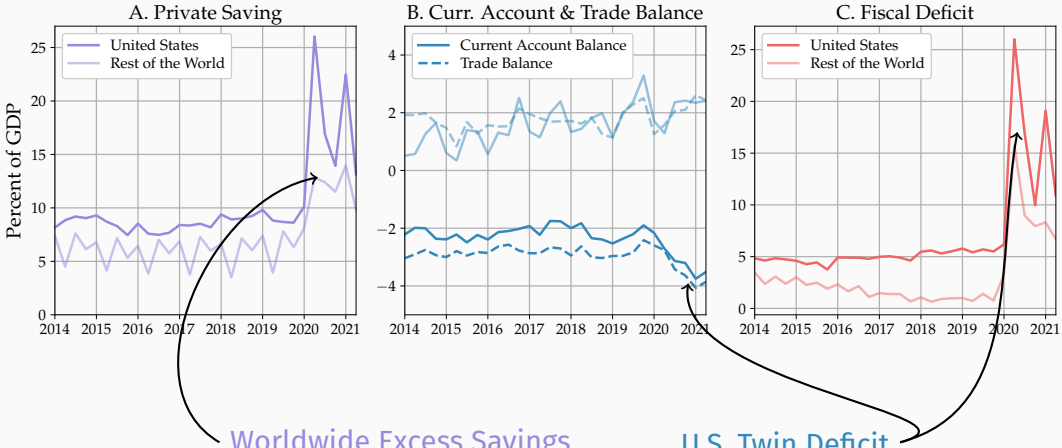

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  - At macro level, quantitatively gets Fact 1 and Fact 2 as consequence of Fact 3

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  - At macro level, quantitatively gets Fact 1 and Fact 2 as consequence of Fact 3
- We also rule out leading alternative explanations for Fact 1 and Fact 2

Why do we need a new model to think about this?

- Leading models of open-economy fiscal policy assume either:
  1. Ricardian equivalence, or
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  These models are inconsistent with two salient facts from the pandemic.

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- We show that moving away from 1. and 2. has major implications for both excess savings and twin deficits

What we do

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     - Spending down leads to **highly persistent** effect on current accounts
- Provide analytical expressions for GE dynamics from a fiscal expansion
  - “sequence-space” formula for output, private savings and the current account
- Study counterfactual effect of worldwide covid-related fiscal interventions

More evidence on our three Facts

Measuring excess savings

- Take sample of 26 advanced economies with balance of payments data
- For each country k, starting in 2020Q1, define:

$$\text{excess private savings}_t^k \equiv \sum_{s=1}^{t} \left(\frac{PS_s^k}{Y_0^k \left(1+\overline{g^k}\right)^s} - \overline{\left(\frac{PS}{Y}\right)^k} \right)$$

Excess change in private wealth, excluding valuation effects.

Data: *PS* from OCED Quarterly National Accounts, Y^k, $\overline{g^k}$ (nominal growth) , *CA*, *FD* from IMF International Financial Statistics.
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- Do the same with:
  - current account balance $CA \rightarrow$ "excess current accounts"
  - fiscal deficit $FD \rightarrow$ "excess fiscal deficits"
  - net investment $I \rightarrow$ "excess capital accumulation"

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Excess fiscal deficits decomposition

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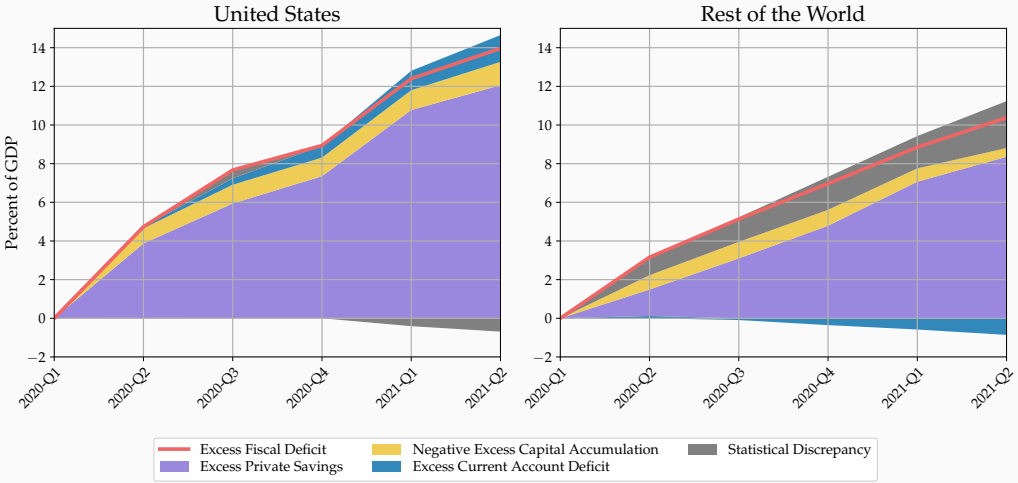
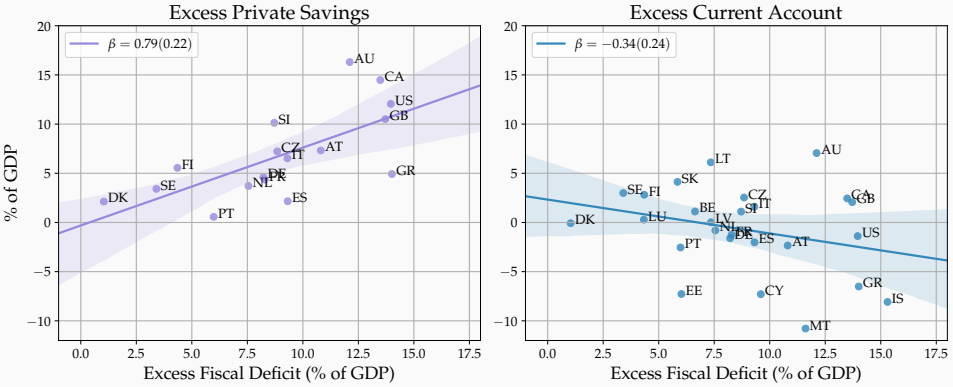


Fiscal deficits explain savings and current accounts in cross section

Covid stories



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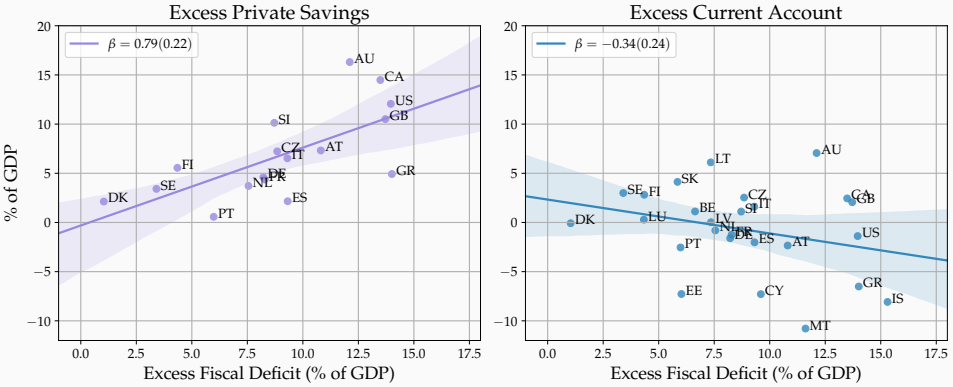

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- Covid stories such as “bigger lockdowns made people save more” don’t work

A many-country HANK model for fiscal policy analysis

Model overview

- Discrete time, many-country open economy model
  - No aggregate uncertainty + small shocks (first order perturb. wrt aggregates)
- Each country consumes two types of goods
  - "Home": H, produced at home, home price P_{Ht}
  - "World": W, basket of goods from all countries, home price P_{Wt}
  - Substitution elasticities: η between H and W, γ b/w different countries in W
  - Bundle of home and world good has home price P_t (consumer price index)
  - Nominal rigidities in wages, flexible prices, law of one price

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- Countries have:
  - exogenous, fixed productivity differences (Θ) $\rightarrow$ GDP differences
  - each a mass 1 of domestic households, s.t. idiosyncratic income risk

Consumption behavior of households

▸ preferences

- Intertemporal problem of home agents:

$$\max_{\{c_{it}\}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta_i^t \left\{ \frac{c_{it}^{1-\sigma}}{1-\sigma} - v(N_t) \right\}$$

$$c_{it} + a_{it+1} = (1 + r_t) a_{it} + \kappa_t \left(e_{it} \frac{W_t}{P_t} N_t \right)^{1-\lambda} \qquad a_{it+1} \geq 0 \qquad C_t \equiv \int c_{it} di$$

  - gross labor income taxed progressively, index λ [Heathcote-Storesletten-Violante]
  - a_{it} = savings in domestic real assets

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- Intratemporal problem: divide c_{it} into c_{iHt} and c_{ikt}, in aggregate:

$$C_{Ht} = (1-\alpha) \left(\frac{P_{Ht}}{P_t} \right)^{-\eta} C_t \qquad C_{kt} = \alpha \omega^k \left(\frac{P_{kt}}{P_{Wt}} \right)^{-\gamma} \left(\frac{P_{Wt}}{P_t} \right)^{-\eta} C_t$$

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- Domestic production linear in labor: $Y_t = \Theta N_t$

Prices, nominal rigidities, and goods market clearing

- Exchange rates quoted wrt virtual "star" currency, which has $P_t^* = P_{Wt}^* = 1$.
  - Nominal exchg rate $\mathcal{E}_t$, real $Q_t \equiv \mathcal{E}_t / P_t$, $\uparrow$ is depreciation of home currency

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- Standard nominal wage rigidity: [Erceg-Henderson-Levin, Auclert-Rognlie-Straub]

$$\pi_{wt} = \kappa_w \left(\frac{v'(N_t)/u'(C_t)}{\mu_w W_t / P_t} - 1 \right) + \beta \pi_{wt+1}$$

- Flexible prices everywhere (as in producer currency pricing paradigm):

$$P_{Ht} = \frac{W_t}{\Theta} \qquad P_{Wt} = \mathcal{E}_t \qquad P_{kt} = \mathcal{E}_t \frac{P_{Ht}^k}{\mathcal{E}_t^k}$$

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- Domestic goods market clearing ($G_t \equiv$government purchases):

$$Y_t = (1-\alpha) \left(\frac{P_{Ht}}{P_t} \right)^{-\eta} C_t + \omega \left(\frac{P_{Ht}}{P_{Wt}} \right)^{-\gamma} \underbrace{\left(\sum_{k=1}^{K} \alpha^k \left(Q_t^k \right)^{-\eta} C_t^k \right)}_{C_t^*} + G_t$$

Fiscal and monetary policy

- Fiscal policy sets G_t and bonds B_t; adjusts tax intercept κ_t so that

$$B_t = (1 + r_{t-1}) B_{t-1} + \frac{P_{Ht}}{P_t} G_t - \left(\frac{W_t}{P_t} N_t - \kappa_t \int \left(e_{it} \frac{W_t}{P_t} N_t \right)^{1-\lambda} di \right)$$

- Aggregate supply of assets $\equiv$ world bonds B_t^k:
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- Home cental bank sets home nominal rate i_t
  - Policy rules: constant CPI-based real interest rate, $i_t = r + \pi_{t+1}$, or Taylor rules
- Star country central bank sets i_t^* to target $P_{Wt}^* = 1$

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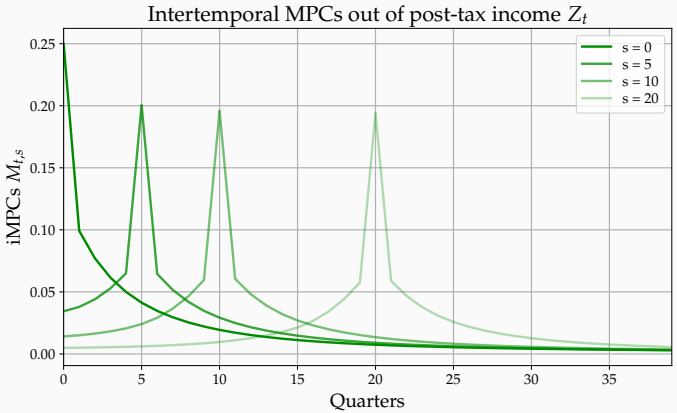
- Star country central bank sets i_t^* to target $P_{Wt}^* = 1$
- Financial intermediaries can invest freely in asset in the world
  - equalized $\mathbb{E}$ returns $\rightarrow$ UIP holds:

$$1 + i_t = (1 + i_t^*) \frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} \qquad 1 + r = (1 + i_t^*) \frac{Q_{t+1}}{Q_t}$$

Benchmark model calibration

details

- Two key objects: α (openness) and "iMPC" matrix **M**, with $M_{t,s} = \frac{\partial C_t}{\partial Z_s}$



- Calibration is otherwise standard, unitary elasticities as in Cole-Obstfeld

Excess savings and twin deficits in the small open economy

Setup

- Take very small economy (SOE). Assume $r = 0$.
- Consider a permanent shock to bonds $B_t \uparrow$, holding G fixed
  - Government issues debt to finance transfers to households
- **What happens in the long-run? In the short-run?**

Long-run result

Proposition

In the long-run natural allocation, the country has zero excess savings and a perfect twin deficit:

$$\Delta A = 0 \qquad \Delta NFA = -\Delta B$$

- Intuition: $r = 0$ + SOE implies no fiscal consequence of increase in debt.
- Post-tax incomes are unchanged $\rightarrow$ private wealth returns to target.
- All debt must be held abroad.

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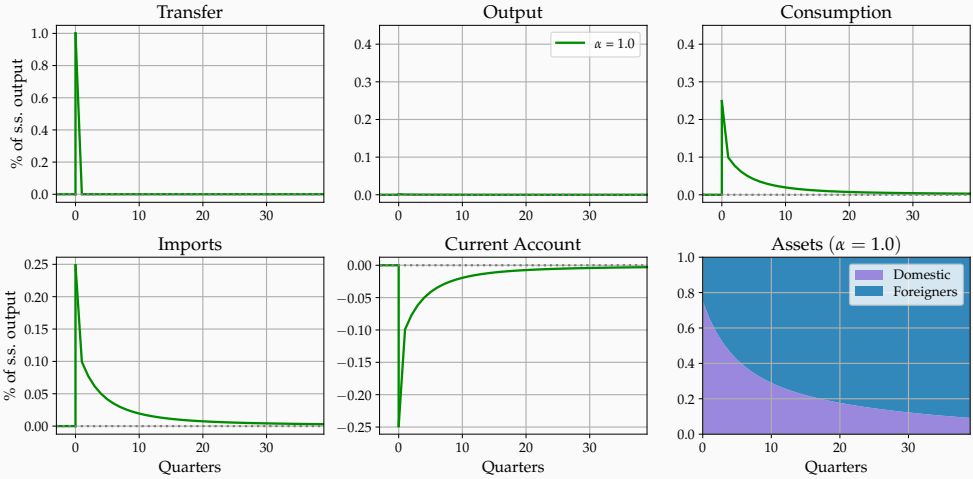
- How do we get there?

Short run dynamics: importance of MPCs and openness

▸ Sequence space formula

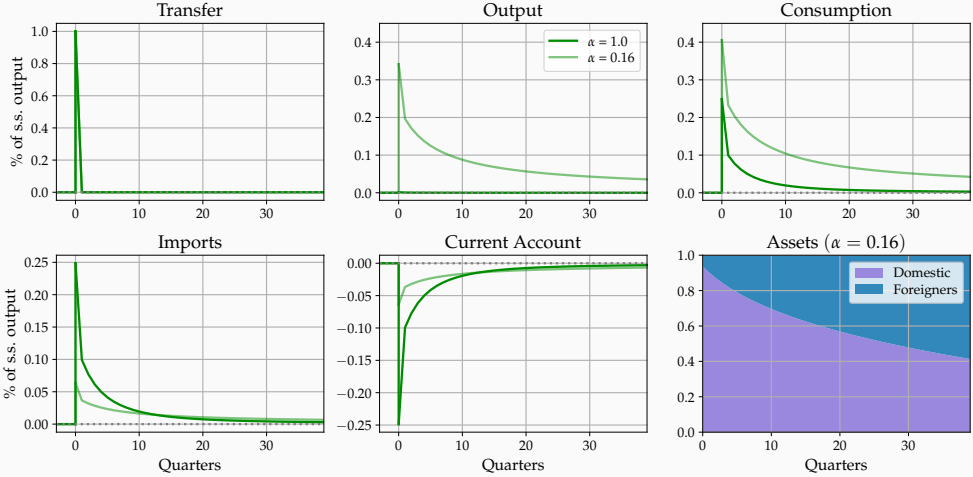
Suppose first country has no home bias $\alpha = 1$. iMPCs $\Rightarrow$ slow dynamics



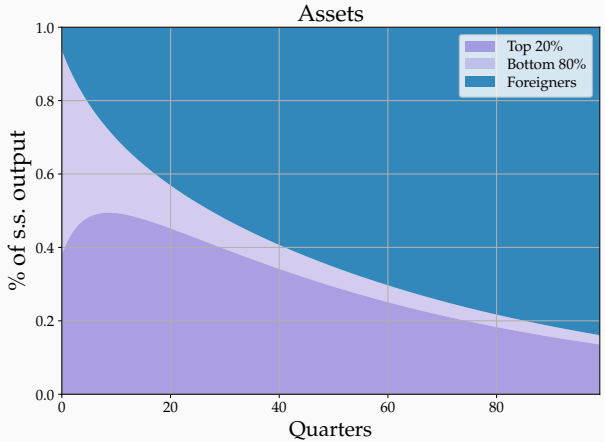
Short run dynamics: importance of MPCs and openness

▸ Sequence space formula

Next, country has realistic $\alpha < 1$. Dynamics of nfa much slower! ("$\alpha \times \mathbf{M}$")

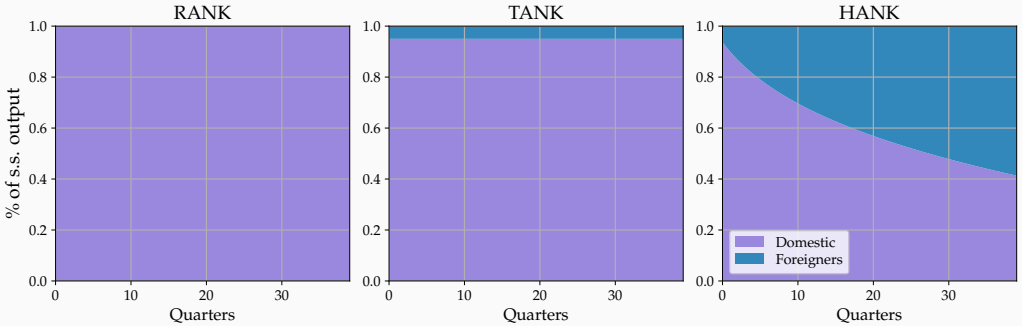


Distributional dynamics: three phases of asset ownership



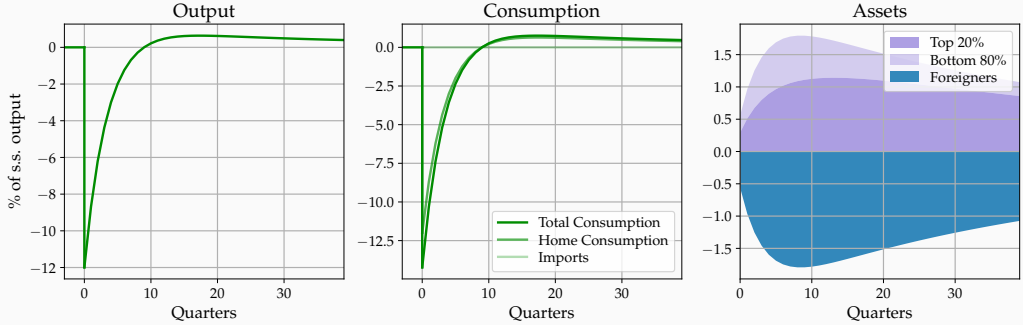
- In closed enough economies, wealth of the rich *rises* initially

Standard models behave very differently!



- RANK model (Ricardian Equivalence): no spending down at all
- TANK model (Hand-to-Mouth agents): no spending down of excess savings

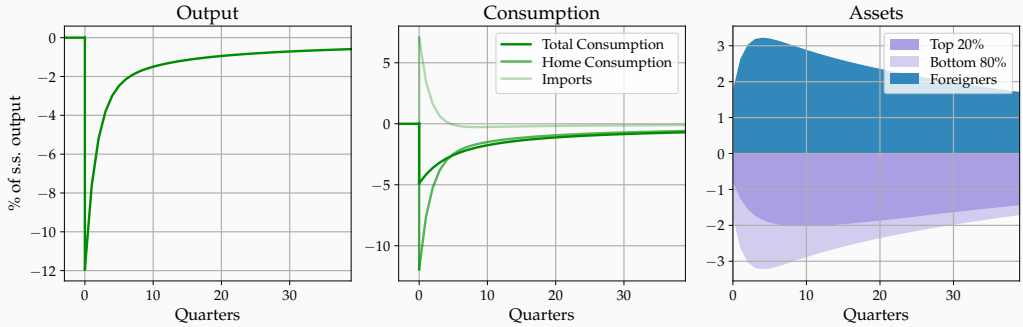
Can a covid shock explain excess savings?



- Shock to overall spending: yes, but magnitude small
- Why? Fall in desired spending mostly causes fall in domestic income

Can a covid shock explain excess savings?

back



- Shock to domestic spending (eg services): no!
- Reallocation towards foreign good causes *CA* deficit, country dissaves

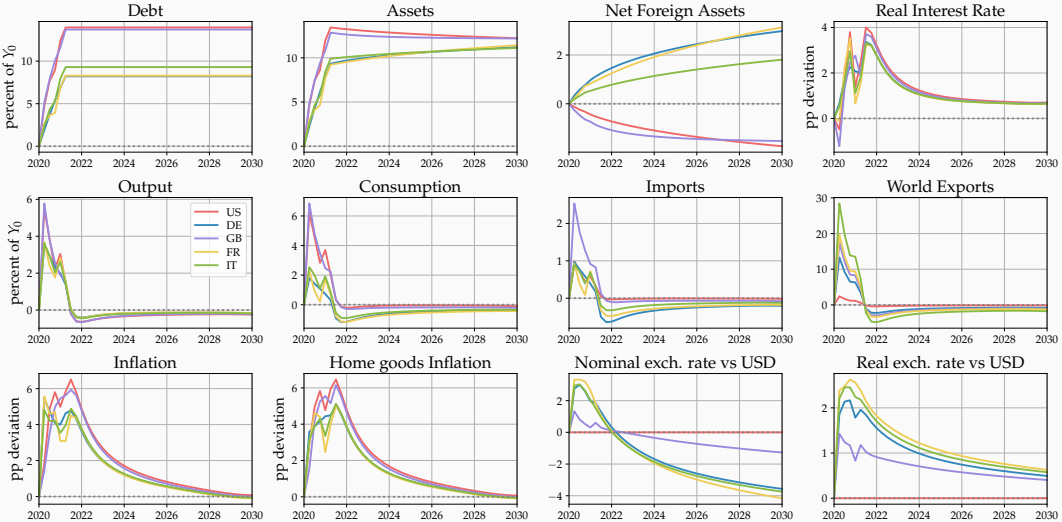
Application to world covid fiscal expansion

Most general setup

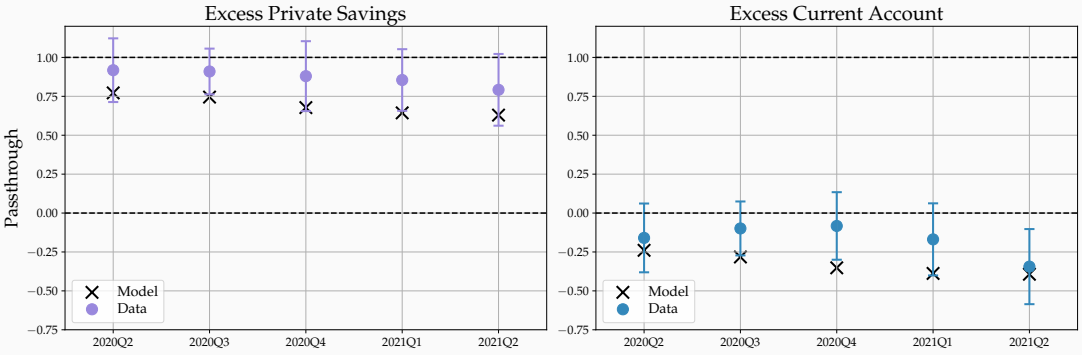
- Now simulate a realistic calibration of our 26-country HANK model
  - Feed in path of $\Delta B_t^k \equiv$ observed path of excess fiscal deficits
- World natural rate rises to convince households to hold the extra debt
  - Central banks slowly increase in their Taylor rule intercept in response
- 26 wealth distributions $\rightarrow$ not an easy model to solve!
  - Solution adapts sequence-space Jacobian method to this case

[Auclert-Bardóczy-Rognlie-Straub]

Effect of worldwide fiscal interventions alone



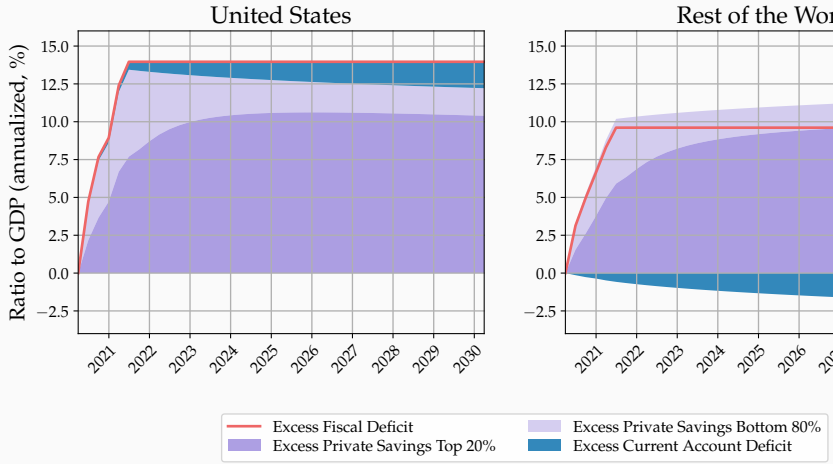
Model successfully predicts cross-country passthrough



[Bars show 68% confidence intervals in data]

- Compare regressions of ΔA^k and ΔNFA^k on ΔB^k in model vs data

Dynamics of ownership of the public debt



- By the end of the decade, most of the debt is held by the world's rich

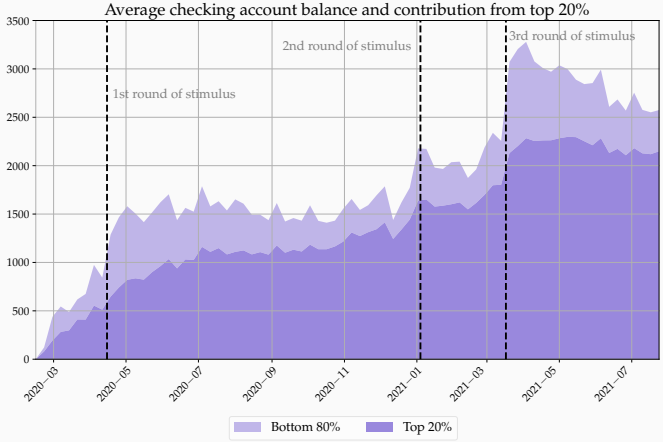
Conclusion

Excess savings are there to last....

- but held increasingly by the world's rich
- and twin deficits pool them across countries
- model predicts that they will boost output and inflation for a while

Evidence of “spending down” effect

back



- Excess savings from transfers mostly held by the rich after a few Q

Source JP Morgan Chase Institute [Cox et al 2020, Greig, Deadman and Sonthalia 2021.]

Covid correlates do much worse

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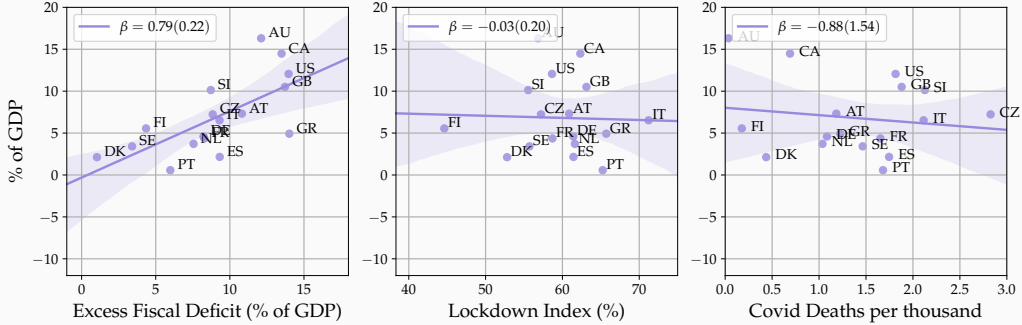
Excess Private Savings



Covid correlates do much worse

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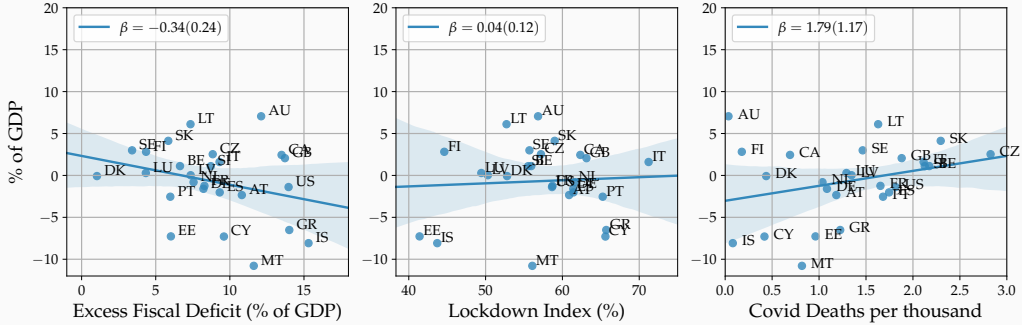
Excess Current Accounts



- In baseline, consumption c_{it} aggregates H and F with elasticity η,

$$c_{it} = \left[(1-\alpha)^{\frac{1}{\eta}} (c_{iHt})^{\frac{\eta-1}{\eta}} + \alpha^{\frac{1}{\eta}} (c_{iWt})^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}$$

  and preferences for goods produced in countries k are

$$c_{iWt} = \left(\sum_{k=1}^{K} \left(\omega^k \right)^{\frac{1}{\gamma}} \left(c_{it}^k \right)^{\frac{\gamma-1}{\gamma}} dk \right)^{\frac{\gamma}{\gamma-1}}$$

  with $\gamma > 0$ and $\eta > 0$. Nominal budget constraint:

$$P_{Ht} c_{iHt} + \sum_k P_{kt} c_{it}^k + A_{it+1} \leq (1 + i_t) A_{it} + P_t \cdot \kappa_t \left(e_{it} \frac{W_t}{P_t} N_t \right)^{1-\lambda}$$

- Demand for country k good by consumer i:

$$c_{it}^k = \alpha \omega^k \left(\frac{P_{kt}}{P_{Wt}} \right)^{-\gamma} \left(\frac{P_{Wt}}{P_t} \right)^{-\eta} c_{it}$$

U.S. calibration

Parameter	Value (U.S.)	Parameter	Value (U.S.)
r	0%	G/Y	0.14
σ	1	B/Y	0.82
η	1	nfa/Y	0
γ	1	β	0.992
α	0.16	δ	0.098
ϕ	2	κ_w	0.1
λ	0.181	ϕ_π	1.5

Proposition

*Assume constant-r monetary policy, $r = 0$. The response of output d***Y***, the current account d***CA***, and private savings d***PS*** to a change in the fiscal deficit d***FD*** is given by*

$$d\mathbf{Y} = (1-\alpha)\,\mathbf{M}\left(\sum_k (1-\alpha)^k\,\mathbf{M}^k\right) d\mathbf{FD}$$

$$-d\mathbf{CA} = \alpha\mathbf{M}\left(\sum_k (1-\alpha)^k\,\mathbf{M}^k\right) d\mathbf{FD}$$

$$d\mathbf{PS} = (I-\mathbf{M})\left(\sum_k (1-\alpha)^k\,\mathbf{M}^k\right) d\mathbf{FD}$$