

# Consumption Network, Fiscal Policy and Sectoral Dynamics

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## Motivation

- ▶ Households differ in their marginal propensity to consume (MPC)
- ▶ Redistribution between households plays a key role in the transmission of shocks
  - > eg. if a shock affects mostly high-MPC households  $\Rightarrow$  shock is amplified

## This paper

New redistribution channel that operates through a consumption network across sectors:

- > how households spend the *marginal income* across sectors
- > MPCs of households employed in different sectors

## Empirical evidences

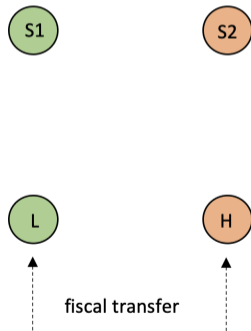
1. Households employed in different sectors have different MPCs (PSID)
2. The marginal consumption basket differs from the average consumption basket (CEX)
3. The marginal spending is biased towards sectors with high-MPC households  
⇒ new redistribution channel between households

## Model

- > Multi-sector TANK model (1. Heterogeneity in MPCs)
- > Non-homothetic preferences (2. marginal cons. basket  $\neq$  average)
- > Transmission of shocks: focus on fiscal policy
- > New redistribution channel  $\Rightarrow$  fiscal multiplier  $\approx 10pp$  larger.

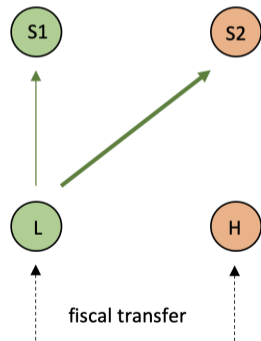
## Stylized example

- > 2 sectors: S1, S2
- > 2 households: low MPC (L) employed in S1, high MPC (H) employed in S2



## Stylized example

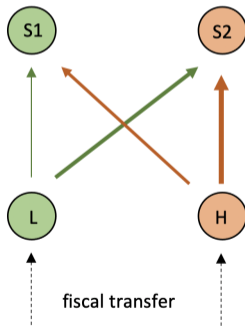
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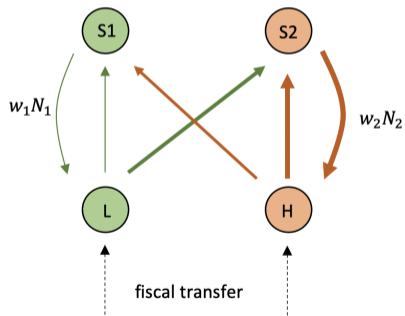
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## Stylized example

- > 2 sectors: S1, S2
- > 2 households: low MPC (L) employed in S1, high MPC (H) employed in S2



- > Consumption: biased towards S2
- > Labor income: endogenous redistribution towards high MPC (H) households
- ⇒ Larger fiscal multiplier

## Transfer Multiplier

- > In a simplified framework, with no IO, the fiscal multiplier of untargeted transfers is:

$$dY = \frac{\overline{MPC}}{1 - \left[ \overline{MPC} + S \times \text{cov}(MPC_s, MS_s - AS_s) \right]}$$

$MPC_s$  = MPC of households employed in sector  $s$

$MS_s$  = Share of sector  $s$  in Marginal cons. basket

$AS_s$  = Share of sector  $s$  in Average cons. basket

- > Empirical findings:  $\text{cov}(MPC_s, MS_s - AS_s) > 0$
- > Quantitative implications: this covariance increases the multiplier by  $\approx 10pp$



### HA with production and consumption networks

Patterson (2023), Flynn, Sturm, Patterson (2021), Andersen and Straub (2022), Baqaee, Farhi (2022)

- > marginal consumption basket, dynamic response

### Propagation of sectoral shocks

Hulten (1978), Gabaix (2010), Acemoglu et al. (2012), Baqaee, Farhi (2019), Baqaee, Farhi (2019b), Bouakez, Rachedi, and Santoro (2020), Almgren et al. (2022)

- > households' consumption behavior: sectoral heterogeneity in MPCs

# Empirical evidences

# Heterogeneity in HTMs across sectors 1/2

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## PSID

- ▶ Measure the share of HTM households employed in each sector
- ⇒ Use this measure to proxy the average MPC of households in each sector

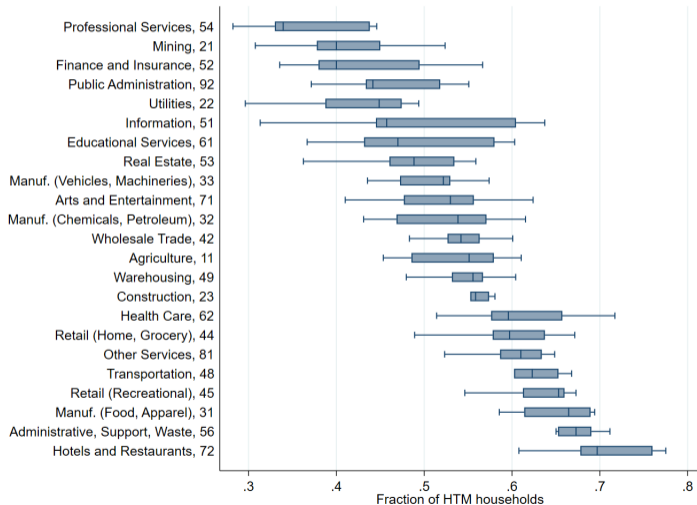
# Heterogeneity in HTMs across sectors 2/2

> Share of HTMs differs across sectors: from 30% to 70%.

Probit

Financials

Details



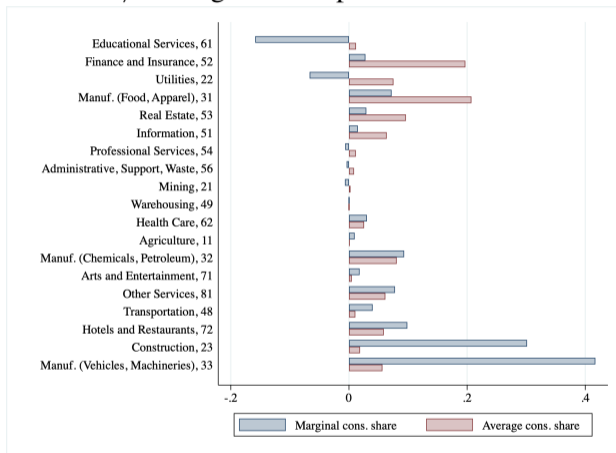
## CEX

- ▶ CEX supplement on '08 tax rebate to estimate the MPC toward each sector
  - > map households' expenditure by good categories (UCC code) → expenditure by sector
- ⇒ Use the estimated MPCs to construct the *marginal consumption basket*
- ⇒ Use data from multiple years to construct the *average consumption basket*

> Marginal consumption shares  $\neq$  average consumption shares.

MPCs

Consumption shares



> Marginal consumption basket biased towards sectors with more HTMs:

$$cov(MPC_s, MS_s - AS_s) > 0$$

# Fiscal policy

- ▶ TA model [Bilbiie (2008)]
- ▶ Fraction of HTMs differs across sectors [PSID]
- ▶ Non-homothetic preferences [CEX]
- ▶ IO networks
- ▶ Nominal wage rigidities
- ▶ Immobility: households can't change sectors
- ▶ Fiscal policy with balanced budget or debt-funded
  - > analytical results
  - > quantitative results



# Analytical results

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## Proposition 1

Consider a stationary equilibrium, with perfectly rigid wages, zero markups, and zero liquidity. The first order effect of untargeted fiscal transfers fully funded with debt is

$$dY \approx \omega' \underbrace{(\mathcal{I} - \mathcal{T} - \mathcal{C})^{-1}}_{\text{amplification}} \underbrace{(\mathcal{H}d\mathbf{T})}_{\text{first round}}$$

# Analytical results

## Proposition 1

Consider a stationary equilibrium, with perfectly rigid wages, zero markups, and zero liquidity. The first order effect of untargeted fiscal transfers fully funded with debt is

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► where  $\mathcal{H}, \mathcal{T}, \mathcal{C}, \omega$  are simple functions of model primitives:

> share of HTM households

[PSID]

> marginal and average consumption shares

[CEX]

> IO networks

[BEA]

⇒ simple quantification that depends on few model primitives:

$$\frac{dY}{1'd\mathbf{T}} = 1.37$$

$$\underbrace{\frac{dY^{\text{counter.}}}{1'd\mathbf{T}}}_{\text{counterfactual: MS=AS}} = 1.27$$

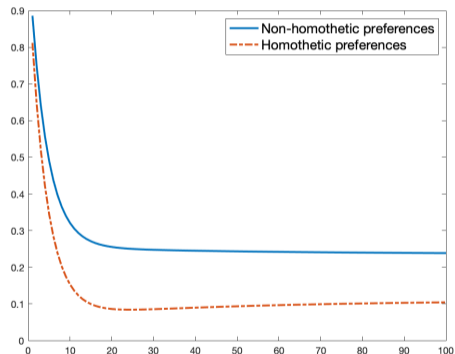
## Calibration and counterfactual

- ▶ Calibrate the full dynamic model with non-homothetic preferences.
  - > Aggregate parameters: standard
  - > Sectoral parameters: PSID, CEX, BEA
- ▶ Construct a counterfactual economy with homothetic preferences  $(MS_s = AS_s)$ 
  - > steady-states are equal in the two economies
  - > only difference is the response to shocks
- ▶ Compare cumulative fiscal multipliers out of a transitory fiscal transfer.

Aggregate parameters

Sectoral parameters

## Cumulative multipliers



Impact multiplier is  $\approx 10$ pp larger

Cumulative multiplier is  $\approx 12$ pp larger (i.e. 2x larger)

- a. higher wage inflation in sectors with more HTMs  
 $\Rightarrow$  redistribution towards HTM households
- b. inflation hits stronger PIH (nominal debt holders)  
 $\Rightarrow$  redistribution towards HTM households

# Conclusions

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- ▶ Households employed in different sectors have different MPC.
- ▶ Marginal consumption basket differs from the average consumption basket.
- ▶ Marginal spending biased towards sectors with high-MPC households.
- ⇒ The impact multiplier of a fiscal transfer is 10pp larger.
  - > Redistribution channel: Leontief inverse
- ⇒ The cumulative multiplier of a fiscal transfer is 12pp larger.
  - > Redistribution channel: Leontief inverse, heterogeneous wage inflation, assets devaluation

# Appendix

## Heterogeneity in HTMs across sectors

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- ▶ Households for the period 2003:2019
- ▶ Classify HTM according to Kaplan, Violante, Weidner (2014):

$$(\text{Liquid wealth})_{it} \leq (\text{Weekly income})_{it}$$

- ▶ Idea: HTMs households consume all the available income
  - ▶ Fact: workers are paid bi-weekly
  - ▶ Issue: we don't know when it was the last pay period
- ▶ Allocate households to sectors according to the sector in which the head works
- ▶ For each sector  $s$ , at each  $t$ , we compute the share of HTMs households  $H_{st}$

# Estimate MPCs

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- ▶ Households' expenditure by good categories (UCC code).
- ▶ Map UCC codes into NAICS code. [Hubmer (2021),Levinson, O'Brian (2019)]
- ▶ CEX Supplement ('08 tax rebate) to estimate MPCs [Parker et al. (2013)]

$$C_{i,t+1} - C_{i,t} = \sum_j \beta_{0j} \times \text{month}_{j,i} + \underbrace{\beta_2 ESP_{i,t+1}}_{\text{Average MPC}} + \beta_{s1}' \mathbf{X}_{i,t} + u_{i,t+1}, \quad (MPC)$$

$$C_{i,s,t+1} - C_{i,s,t} = \sum_j \beta_{0j} \times \text{month}_{j,i} + \underbrace{\beta_{2,s} ESP_{i,t+1}}_{\text{MPC towards sector s}} + \beta_{s1}' \mathbf{X}_{i,t} + u_{i,t+1}, \quad (MPC_s)$$



## Construct marginal and average consumption shares

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- ▶ Use  $\beta_{2,s}$  and  $\beta_2$  to construct **marginal consumption shares**

$$MCS_s = \frac{\beta_{2,s}}{\beta_2} = \frac{\text{Marginal propensity to consume in sector } s}{\text{Marginal propensity to consume}} \quad (1)$$

- ▶ Use CEX 1997:2013 to compute **average consumption shares**

$$ACS_s = \sum_{i,t} \frac{C_{i,s,t}}{C_{i,t}} \quad (2)$$

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**Aggregate parameters**


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Parameter	Description	Value
$\gamma$	Elasticity of substitution across sectors (firms)	1
$\eta$	Elasticity of substitution across sectors (households)	1
$\nu$	Elasticity of substitution between labor inputs and intermediate goods	1
$\epsilon$	Elasticity of substitution across varieties, within sectors	10
$\sigma$	CRRA	1
$\psi$	Frisch elasticity	1
$\beta$	Households' discount factor	0.98
$\phi$	Wage rigidity, adjustment costs (scale parameter)	50
$\rho_B$	Persistence of government debt	0.8

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**Sector specific parameters**


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Parameter	Description	Target
$\{H_s\}_s$	Shares of HTM households	Evidences from PSID
$\{m_s\}_s$	Shares of subsistence consumption	Evidences from CEX
$\{\alpha_s\}_s$	Shares of discretionary consumption	Evidences from CEX
$\{\omega_s\}_s$	Labor share in production	Labor share (BEA IO tables)
$\{\delta_{st}\}_{s,t}$	Intermediates' shares in production	Intermediates' share (BEA IO tables)
$\{z_s\}_s$	Sectoral productivity	Steady-state: $p_s = 1$
$\{\lambda_s\}_s$	Measure of households in sector $s$	

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# Drivers of Heterogeneity

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- ▶ Demographics and income explain HTM status
- ▶ Sector has basically no additional explanatory power

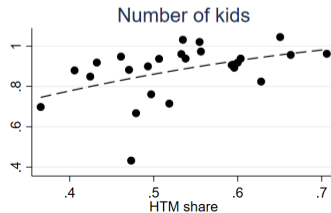
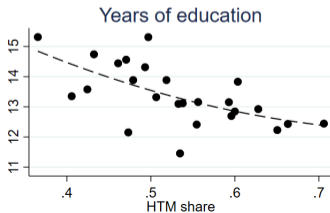
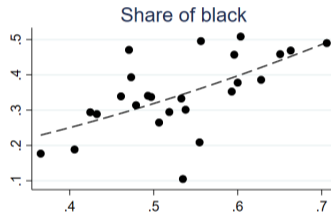
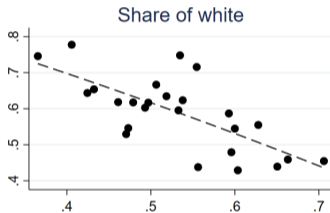
	(1)	(2)	(3)	(4)	(5)	(6)
Demographics*	✓	✓				
Income (Log)	✓		✓			✓
Liquid Assets (Log)					✓	✓
Corr	0.341	0.280	0.260	-	0.778	1
Adding sector dummy	0.349	0.305	0.274	0.162	0.788	-

\* Age, white dummy, number of kids

# Drivers of Heterogeneity - Demographics

- ▶ Race is particularly neat.

## Demographics by sector



# Drivers of Heterogeneity - Financials

- ▶ Difference in liquid assets is especially neat.

## Household financials by sector

