# HOUSEHOLDS

- Representative household with a growing number of members
- Current income effect
- Net worth effect

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# CHOICES MADE BY HOUSEHOLDS

- Demand consumption goods
- Demand for investment goods and capital accumulation
- Utilization of capital
- Labor supply
- Demand for (bank) deposits
- Demand for (bank) loans

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# LIFETIME UTILITY FUNCTION

Representative household with a growing number of members

$$\mathrm{X}_0 \sum_{t=0}^{\infty} \left( \log \frac{ch_t - ch_t^{\mathrm{ref}}}{nn_t} - \frac{1}{1+\eta} \, nh_t{}^{\eta} + \nu_1 \, \log \frac{netw_t}{pch_t \cdot nn_t} \right) nn_t \tag{1}$$

Nominal net worth in (1)

$$netw_t = pkh_t \cdot kh_t + bd_t - bl_t \tag{2}$$

Point of reference in household consumption is

$$ch_t^{\mathrm{ref}} = \chi \, \frac{curr_t}{pch_t}$$

$$curr_t = w_t \cdot nh_t \cdot nl_t - trl1_t$$

where x and

| Variable | Description |
|---|---|
| $ch_t$ | Household consumption |
| $ch_t^{\mathrm{ref}}$ | Point of reference in household consumption |
| $nl_t$ | Labor force |
| $nh_t$ | Per-worker labor supply (e.g. per-worker hours worked) |
| $netw_t$ | Nominal net worth of households |
| $curr_t$ | Nominal current income of households |
| $txls1_t$ | Net lump-sum taxes (transfers) of type 1 |

# BUDGET CONSTRAINT

$$bd_t - bl_t = rbd_{t-1} \cdot bd_{t-1} - rbl_{t-1} \cdot bl_{t-1}$$

$$+ w_t \cdot nh_t \cdot \backslash nl_t + puk_t \cdot u_t \cdot k_t + zy_t + zb_t$$

$$- pch_t \cdot ch_t - pih_t \cdot ih_t$$

$$- trl1_t - trl2_t - adj_t$$

Lagrange multiplier associated with the budget constraint is denoted by $vh_t$ (shadow value of nominal household wealth)

| Variable | Description |
|---|---|
| $bd_t$ | Bank deposits |
| $bl_t$ | Bank loans |
| $w_t$ | Nominal wage rate |
| $prf_{y,t}$ | Profits from producers |
| $prf_{f,t}$ | Profits from financial sector |
| $jh_t$ | Adjustment costs faced by households |
| $txls1_t$ | Type 1 net lump-sum taxes (transfers) |
| $txls2_t$ | Type 2 net lump-sum taxes (transfers) |

# HOUSEHOLD ADJUSTMENT COSTS

- Investment adjustment costs
- Reference point in capital accumulation
- Cost of utilization of capital

$$jh_t = \frac{1}{2}\, \xi_{ih} \cdot pih_t \cdot ih_t \left(\Delta \log ih_t - \log \kappa_{ih}\right)^2$$

$$+ \frac{1}{2}\, \xi_k \cdot pkh_t \cdot kh_t \left(\log kh_t - \log kh_t^{\mathrm{ref}}\right)^2$$

$$+ py_t \cdot kh_t \cdot (v_0 \cdot u_t)^{v_1}$$

Point of reference in capital accumulation

$$kh_t^{\mathrm{ref}} = \mathrm{X}_t \left[kh_{t+1} \cdot \kappa_{kh}^{-1}\right] \tag{3}$$

Steady-state adjustment constants

$$\kappa_{ih} = \frac{ih\backslash\mathrm{ss}}{ih\backslash\mathrm{ssm}} \qquad\qquad \kappa_{kh} = \frac{kh\backslash\mathrm{ss}}{kh\backslash\mathrm{ssm}} \tag{4}$$

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# CAPITAL ACCUMULATION

$$kh_t = (1 - \delta)\, kh_{t-1} + ih_t \tag{5}$$

Lagrange multiplier associated with the capital accumulation constraint is denoted by $pkh_t$ (shadow price of capital)

| Variable | Description |
|----------|-------------|
| $kh_t$ | Stock of private production capital |
| $ih_t$ | Investment in private production capital |

# FINANCE CONTRAINT

Sufficient amount of means of payment needs to be held proportional to gross expenditures (consumption, investment, trade in capital)

$$bd_t = \phi\Big(pch_t \cdot ch_t + pih_t \cdot ih_t + \phi_k \cdot pkh_t \cdot kh_t\Big) \tag{6}$$

# REAL WAGE RIGIDITIES

Real wages are sluggish in their response to changes in optimal flexible wage rate; no expliciti microfoundations

$$\log \frac{w_t}{pch_t} = \rho_w \, \log\Big(\kappa_w \cdot \frac{w_{t-1}}{pch_{t-1}}\Big) + (1 - \rho_w) \, \log \frac{w0_t}{pch_t} + \epsilon_{w,t} \tag{7}$$

Steady-state adjustment constant

$$\kappa_w = \frac{w\backslash\mathrm{ss} \cdot pch\backslash\mathrm{ssm}}{w\backslash\mathrm{ssm} \cdot pch\backslash\mathrm{ss}} \tag{8}$$

| Variable | Description |
|---|---|
| $w0_t$ | Optimal flexible nominal wage rate as if optimized by households |
| $w_t$ | Actual nominal wage rate |