

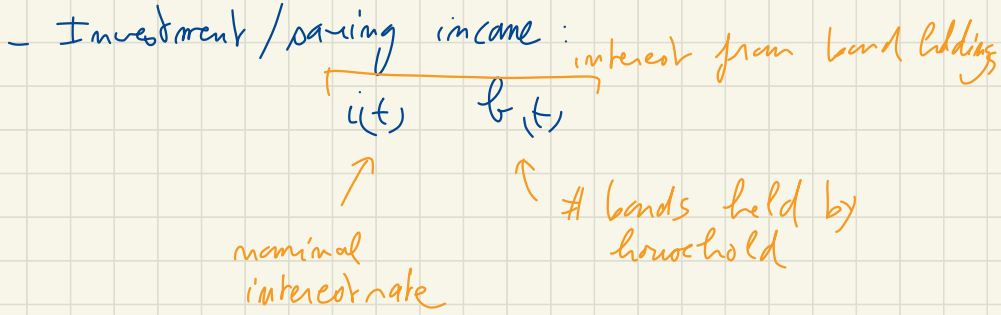
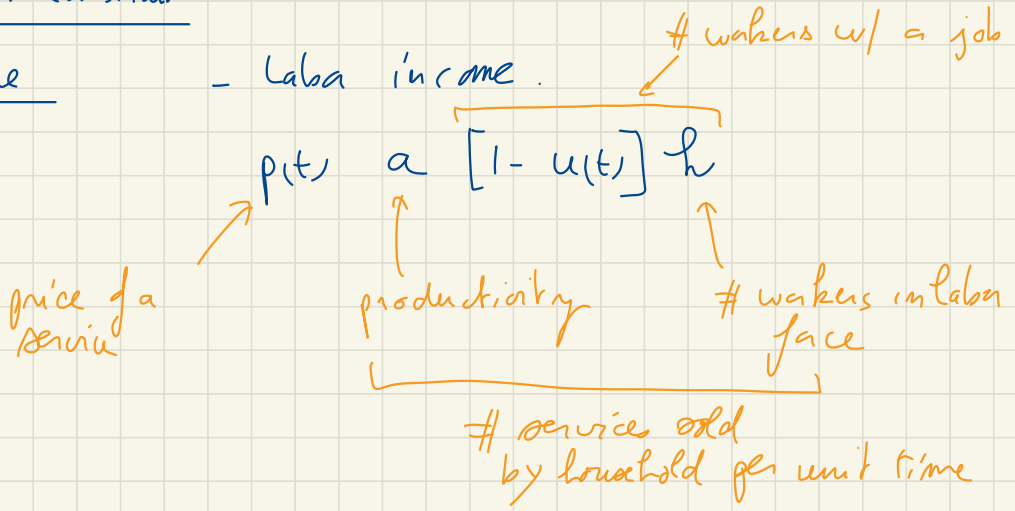
# Household's Budget Constraint

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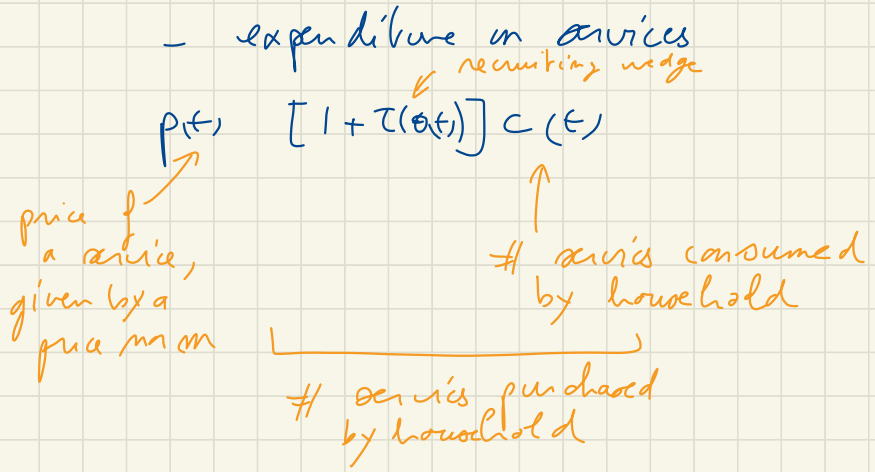
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# Budget constraint:

## Income



## Expenditure



- Lump-sum tax to finance interest payments  $\tau(t)$

## Nominal budget constraint.

$$\dot{\bar{b}}(t) = i(t) \bar{b}(t) + p(t) a [1 - u(t)] h - p(t) [1 + \tau(t)] c(t) - T(t)$$

change in  
savings/nominal  
wealth at  $t$ .

## Budget constraint in real terms:

real stock of bonds:  $\underline{w}(t) = \frac{b(t)}{p(t)}$

real interest rate  $\underline{r}(t) = i(t) - \pi(t)$

nominal interest rate  $\uparrow$   
inflation rate =  $\frac{\dot{p}(t)}{p(t)}$

$$\frac{d}{dt} \ln(w(t)) = \ln(\dot{b}(t)) - \ln(\dot{p}(t))$$
$$\frac{\dot{w}(t)}{w(t)} = \frac{\dot{b}(t)}{b(t)} - \frac{\dot{p}(t)}{p(t)} = \frac{\dot{b}(t)}{b(t)} - \pi(t)$$

$$\dot{w}(t) = w(t) \times \left[ \frac{\dot{b}(t)}{b(t)} \right] - \pi(t) \cdot w(t)$$

$$w(t) / b(t) = 1 / p(t)$$

$$\dot{w}(t) = \frac{\dot{b}(t)}{p(t)} - \pi(t) \cdot w(t)$$

Real budget constraint:

$$\dot{\bar{w}}(t) = \underbrace{i(t)}_{\text{interest rate}} \bar{w}(t) + a [1 - u(t)] h - [1 + \tau(\theta)] c(t) - \frac{T(t)}{p(t)} - \underbrace{\tau_c(t)}_{\text{consumption tax}} \cdot \bar{w}(t)$$

$$\hat{\bar{w}}(t) = r(t) \bar{w}(t) + a [1 - u(t)] h - [1 + \tau(\theta(t))] c(t) - \frac{T(t)}{p(t)}$$