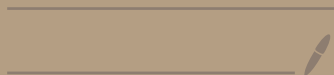


Solving the Household's Problem

Pascal Michailat

<https://www.pascalmichailat.org/t5.html>



Household's problem (concave maximization problem):

$$\max_C \quad \frac{X}{1+X} C^{\frac{\varepsilon-1}{\varepsilon}} + \frac{1}{1+X} \left[\frac{\mu}{P} + f \cdot k - (1+r) C \right]^{\frac{\varepsilon-1}{\varepsilon}}$$

Necessary & sufficient condition for the optimal c (c maximizing utility): derivative = 0

here: $\frac{x}{1+x} \cdot \frac{\varepsilon-1}{\varepsilon} \cdot c^{-\frac{1}{\varepsilon}}$

$$- [1 + \tau(x)] \left[\frac{1}{1+x} \right] \frac{\varepsilon-1}{\varepsilon} \left[\dots \right]^{-1/\varepsilon} = 0$$

$$\frac{p}{p} + \frac{1}{p} \ln - (1+\tau) c = \frac{m}{p}$$

$$x c^{-1/\varepsilon} = [1 + \tau(x)] \left[\frac{m/p}{p} \right]^{-1/\varepsilon}$$

\propto MCE of services

\propto MU of real money balances / real wealth

price of services relative to real money balances

$$c^{-1/\varepsilon} = \frac{1 + \tau(x)}{x} (m/p)^{-1/\varepsilon}$$

$$c = \left[\frac{x}{1 + \tau(x)} \right]^\varepsilon \cdot \frac{m}{p}$$

- c : consumption of service
- # services purchased by household: y

$$y = [1 + \tau(x)] \cdot c$$

- # visits by household: v

$$v = y / q(x) = c [1 + \tau(x)] / q(x)$$