

## Problem Set 4: Cash-in-Advance Model

Econ720. Fall 2015. Prof. Lutz Hendricks

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### 1 Shopping time

**Demographics:** There is a single representative household who lives forever.

**Preferences:** The household values consumption ( $c$ ) and leisure ( $l$ ) according to

$$\sum_{t=0}^{\infty} \beta^t u(c_t, l_t); \quad 0 < \beta < 1.$$

**Endowments:** In each period, the agent is endowed with 1 unit of time that can be used for leisure ( $l$ ), work ( $n$ ), and shopping ( $s$ ):

$$1 = l_t + n_t + s_t$$

The household is endowed with  $k_0$  units of capital and  $M_0$  units of money in period 0.

**Technology:** The transactions technology is such that  $s_t$  units of time are required to purchase  $c_t$  given money balances  $m_t = M_t/P_t$ :

$$s_t = g(c_t, m_t)$$

where  $P_t$  is the price of the good. Obviously,  $g_c > 0$  and  $g_m < 0$ .

Goods are produced from capital and labor with the production function  $f(k_t, n_t)$ , which has nice properties. The resource constraint is  $f(k, n) + (1 - \delta)k = c + k'$ .

**Markets:** The usual markets for goods, money, capital and labor rental operate. There is no government and the money supply is constant.

#### Questions:

1. Define a solution to the household problem.
2. Define a competitive equilibrium.
3. Is money neutral in this economy? Prove your answer using the system of equations that define a competitive equilibrium.
4. Would money still be neutral if the transactions technology used nominal money balances i.e.,  $s_t = g(c_t, M_t)$ ? Explain the intuition. You need not derive your answer.