

## The Linear Expenditure System

When households consume more than one good, we must use the *linear expenditure system*. Even if we have only one domestic good, if consumers are allowed to consume imports, we still need to use the LES.

Consumption of good  $i$  by household  $h$  is

$$C_{ih} = \theta_{ih} + \frac{m_{ih}}{p_i}(E_h - \Sigma p_i \theta_{ih})$$

where  $\theta_{ih}$  is defined as the *subsistence consumption of good  $i$*  by hh  $h$ .

This is an “adding up” consumption function in that in the end

$$\Sigma_i C_{ih} = E_h$$

where  $E = (1 - s)(1 - t_h)Y_h$ . One can define *Frisch Parameters*

$$f_h = \frac{E_h}{(E_h - \Sigma p_i \theta_{ih})}$$

as the ratio of expenditure to supernumerary expenditure and is a measure of the marginal utility of income with respect to income. This can then be substituted into the consumption function

$$C_{ih} = \theta_{ih} + \frac{m_{ih}}{p_i f_h} \Sigma_i C_{ih}$$

but  $m_{ih} = C_{ih} / \Sigma_i C_{ih}$  so that

$$C_{ih} = \theta_{ih} + \frac{C_{ih} / \Sigma_i C_{ih}}{p_i f_h} \Sigma_i C_{ih}$$

and since  $p_i$  is always equal to one for the base SAM, we have

$$C_{ih} = \theta_{ih} + \frac{C_{ih}}{f_h \Sigma_i C_{ih}} (\Sigma_i C_{ih})$$

simplifying

$$C_{ih} = \theta_{ih} + \frac{C_{ih}}{f_h}$$

or

$$C_{ih} \left( 1 - \frac{1}{f_h} \right) = \theta_{ih}$$