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# **Consumption Time in Household Production: Implications for the Goods-Time Elasticity of Substitution**

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# Consumption Time in Household Production: Implications for the Goods-Time Elasticity of Substitution

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**Q: How does consumption time affect the elasticity of substitution (EOS) between goods and time?**

**A: Consumption time decreases the EOS between goods and time.**

## Setting

- Meal Production in the home
  - ❑ Two possible definitions of a “meal”
    - “Eating occasion” (includes the consumption time)
    - “Meal production” (excludes the consumption time)
- Two inputs: goods (food items) and time (labor)

## Analytical Result

The difference in the “eating” and “meal production” goods-time EOS is shown to depend on the difference in the elasticity of time in food production with respect to the wage rate ( $\eta_{tf} < 0$ ) and the elasticity of time in food consumption with respect to the wage rate ( $\eta_{tc} < 0$ ). Specifically, the goods-time EOS **without** consumption time is

$$\sigma_f = \partial \ln(x_f/t_f) / \partial \ln w = \partial \ln x_f / \partial \ln w - \partial \ln t_f / \partial \ln w = \eta_{xf} - \eta_{tf} \quad (1)$$

and the goods-time EOS **with** consumption time is

$$\sigma_e = \partial \ln(x_f/(t_f+t_c)) / \partial \ln w = \partial \ln x_f / \partial \ln w - \partial \ln (t_f+t_c) / \partial \ln w = \eta_{xf} - [s_f \eta_{tf} + s_c \eta_{tc}] \quad (2)$$

where  $x_f$  = expenditure on food;  $t_f$  = time in home meal production;  $t_c$  = time in meal consumption;  $w$  = wage rate; and  $s_i = t_i / (t_f + t_c)$  for  $i=f, c$ ;

Subtracting (2) from (1) and a little algebra yields the difference:

$$\sigma_f - \sigma_e = s_c (\eta_{tc} - \eta_{tf})$$

So, if the production time is more elastic than the consumption time with respect to the wage rate ( $|\eta_{tc}| < |\eta_{tf}|$ ) then the goods-time EOS in “meal production” will be greater than that in “eating”.

## Empirical Result

- Using an approach similar to Hamermesh (2008), we provide an empirical example with the American Time Use Survey (ATUS) data for 2005-2008 matched to the Current Population Survey (CPS) Food Security Supplements (FSS)
- Hamermesh (2008) found the EOS to be about 0.22 to 0.33 in “eating”. Our results suggests more substitutability if the focus is just “meal production”
- Goods-time EOS in “meal production” is about 60% greater than in “eating”

Elasticity of Substitution	Reference- week Food Expenditure	Usual Food Expenditure
With consumption time	0.28 (0.13)	0.31 (0.11)
Without consumption time	0.48 (0.16)	0.49 (0.15)
(N=1872)		

## Conclusion

The goods-time EOS is greater than originally thought when we exclude the consumption time from the household production .

## Reference

Hamermesh, D. S. (2008). “Direct Estimates of Household Production.” *Economics Letters*. Vol. 98:31-34.