

# On Target

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## Intertemporal substitution vs target earning

*Camerer, et al (1997)*

Estimated wage elasticities are significantly negative ... Our interpretation of these findings is that cab drivers (at least inexperienced ones): (i) make labor supply decisions “one day at a time” instead of intertemporally substituting labor and leisure decisions across multiple days (ii) set a loose daily income target and quit once they reach that target.

*Thaler (2015)*

Uber has defended surge pricing on the basis that a higher price will act as an incentive for more drivers to work during peak periods. It is hard to evaluate this argument without seeing internal data on the supply response by drivers, but on the face of it the argument does not seem to be compelling.

*Farber (2005; commenting on Camerer)*

I am puzzled by these findings ... target earning implies that, on days when it's easy to make money (pick low-hanging fruit, so to speak), drivers quit early, whereas on days when fares are scarce, drivers work longer hours.

## Making sense of target earning

Target earning behavior can be motivated by two closely-related behavioral responses

1. Within-period (daily, for cab drivers) income effects in response to wealth-neutral *wage* changes
2. “Reference-dependent preferences” - very low or even zero MU(income) above some ex ante though perhaps malleable target. This induces something like a discontinuous within-period wealth effect: earnings that push me across the target drive marginal utility way down; See Fehr and Goette (2007) for a formal exposition

## Modeling short-term wealth effects

Two periods, with Stone-Geary utility in each:

$$u(c_t, h_t) = \alpha \ln(h_t - h) + \ln(c_t - c); t = 1, 2$$

Prices are fixed at 1.  $h$  is maximum hours;  $c$  is minimum consumption. Lets look at the effects of a (positive) wage shock today, which you pay back tomorrow.

STANDARD Assume the rate of time preference equals the interest rate,  $r$ . We lend and borrow freely, so

$$\begin{aligned} \max \quad & u(c_1, h_1) + \frac{u(c_2, h_2)}{1+r} \\ \text{s.t.} \quad & c_1 + \frac{c_2}{1+r} = w_1 h_1 + \frac{w_2 h_2}{1+r} \end{aligned}$$

FOCs are:

$$\begin{aligned} \frac{\alpha}{h - h} &= w_t \\ \frac{\alpha}{c_t - c} &= \end{aligned}$$

Stone-Geary preferences produce the linear expenditure system:

$$\begin{aligned} w_t h_t &= w_t h + \frac{\alpha}{1+r} \\ c_t &= c + \end{aligned} \tag{1}$$

solves

$$c_1 + \frac{c_2}{1+r} = w_1 h_1 + \frac{w_2 h_2}{1+r}$$

implying

$$\left( c + \right) \frac{2+r}{1+r} = h \left( w_1 + \frac{w_2}{1+r} \right) \left( \frac{\alpha}{1+r} \right)$$

Suppose you get  $w_1$  today, losing  $w_2/(1+r)$  tomorrow, so that the wage profile changes from  $\{w_1, w_2\}$  to  $\{w_1 + w_2/(1+r), w_2\}$ :  $h$  is unchanged; equation (1) implies you work more today, less tomorrow

CONSTRAINED Now suppose you're constrained by within-period budget sets (what about saving? In this two-period model, savings in period 1 produces the life-cycle solution, since only the period 2 constraint

then binds, but this won't happen if wages are increasing; see below). We have:

$$\begin{aligned} \max \quad & u(c_1, h_1) + \frac{u(c_2, h_2)}{1+r} \\ \text{s.t.} \quad & c_1 \leq w_1 h_1 \end{aligned} \quad (2)$$

$$c_2 \leq w_2 h_2 + (1+r)(w_1 h_1 - c_1) \quad (3)$$

The Lagrangian here is:

$$u(c_1, h_1) + \frac{u(c_2, h_2)}{1+r} - \lambda_1(c_1 - w_1 h_1) - \lambda_2(c_2 - w_2 h_2 - (1+r)(w_1 h_1 - c_1))$$

No saving means  $c_1 = w_1 h_1$  and  $c_2 = w_2 h_2$ . FOCs are therefore:

$$\begin{aligned} \left(\frac{1}{1+r}\right)^{t-1} \frac{\alpha}{h_t} &= w_t \\ \left(\frac{1}{1+r}\right)^{t-1} \frac{1}{c_t} &= \lambda_t \end{aligned}$$

These are the FOCs for period-by-period static optimization. The resulting labor supply and commodity demands are given by:

$$w_t h_t = w_t h_t \frac{\alpha}{\lambda_t (1+r)^{t-1}} \quad (4)$$

$$c_t = c_t + \frac{1}{\lambda_t (1+r)^{t-1}}$$

$\lambda_t$  solves

$$c_t(\lambda_t) = w_t h_t(\lambda_t, w_t)$$

implying by (4) that

$$c_t + \frac{1}{\lambda_t (1+r)^{t-1}} = w_t h_t \frac{\alpha}{\lambda_t (1+r)^{t-1}},$$

so each period's MU(wealth) is

$$\lambda_t = \frac{\alpha + 1}{(w_t h_t - c_t)(1+r)^{t-1}} \quad (5)$$

- From here we see that giving you  $\lambda_t$  today, collecting  $(1+r)\lambda_t$  tomorrow lowers  $c_t$  and increases  $h_t$ .
- What's the bottom line for labor supply? Say  $\alpha + 1 = 1$ . Simplifying (4) using (5):

$$\begin{aligned} h_t &= h_t \frac{\alpha}{w_t \lambda_t (1+r)^{t-1}} \\ &= h_t \frac{(w_t h_t - c_t)(1+r)^{t-1} \alpha}{w_t (\alpha + 1)(1+r)^{t-1}} \\ &= h_t (1 - \alpha) + \frac{c_t}{w_t} \alpha \end{aligned}$$

So a wage increase reduces hours - one day at a time!

SAVINGS Suppose, contradictory to claim,  $w_1 < w_2$  and  $c_1 < w_1 h_1$ , that is, we're actually doin' some saving. The consumption FOCs go

$$\frac{c_1}{c} - \lambda_1 (1+r) \lambda_2 = 0$$

$$\frac{c_2}{(c_2 - c)(1+r)} - \lambda_2 = 0$$

Now, we know by complementary slackness that  $\lambda_1 = 0$ . But in period 2, we spend it all, so  $\lambda_2 > 0$ . This means  $c_1 = c_2 = c$ . Using the budget constraints, we have

$$c = w_2 h_2 + (1+r)(w_1 h_1 - c) < w_1 h_1$$

so

$$w_1 h_1 > c > w_2 h_2$$

A similar argument using the hours FOCs begins

$$\frac{\alpha}{h} - \lambda_1 w_1 + (1+r) \lambda_2 w_1 = 0$$

$$\frac{\alpha}{(h - h_2)(1+r)} + \lambda_2 w_2 = 0$$

Again use complementary slackness and manipulate to show:

$$w_2 h_2 - w_1 h_1 > 0,$$

a contradiction.

## Nice Work if You Can get It

### Take me out to the ballgame (Oettinger, 1999)

Members of a corps of stadium vendors choose to show up for as many of 81 home games as they like. Oettinger models the fraction who sell at each game as a function of AHE, instrumenting with game demand parameters.

- Supply: boxes of Crackerjack/hour sold produce an average hourly compensation rate for vendors (boxes\*price\*commission); supply is upward sloping in this
- Demand: Individual fans demand Crackerjack as a downward-sloping function of their price; the demand curve sums these; for a given number of fans, fewer/more customers buying fewer/more boxes/game produce the slope. The curve shifts out as the number of customers increases

### Consider the lobster (Stafford, 2015)

Lobsters come out when the moon is in (because it's darker). Lobstermen come out when lobsters come out.

**Flash and Veloblitz (Fehr and Goette, 2007)**

An RCT that randomized commission rates for some of Zurich's finest riders, while keeping prices to customers unchanged.

**Uber on! (Angrist, Caldwell, and Hall, 2017)**

See Figs. 1-3 and Tables I-III, V in:

Fehr, Ernst, and Lorenz Goette. "Do Workers Work More if Wages are High? Evidence from a Randomized Field Experiment." *The American Economic Review* 97, no. 1 (2007).

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