Comments on "Is Tomorrow Another Day?
The Labor Supply of New York City Cab Drivers"
by Henry S. Farber

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1. Introduction and summary

- A new analysis of the labor supply of NYC taxi drivers.

- Previous work by Camerer, Babcock, Loewenstein, and Thaler (1997) found evidence of target earnings behavior.

- With a new dataset and a different methodology Henry Farber finds no evidence of target earnings behavior.

- Farber regards strong daily income effects as theoretically implausible. He does not believe that drivers have a one-day horizon because people make consumption commitments that are longer than one day.

- As a result, he is concerned that the CBLT results are at odds with positive daily transitory wage elasticities and irrelevant daily income effects.

- I agree with this concern.

- Aside from theoretical arguments, the author puts together three pieces of empirical evidence to make a case against the target earnings hypothesis:

(a) targets vary too much from one day to another within worker.

(b) hour effects on hazards for stopping work dominate income effects.

(c) the CBLT negative elasticities are reproduced with the new data.

2. LS literature in settings with flexible hours

- A noticeable feature of some of these works is that the short run is really short: one day.

- Choice of length of time has been dictated by the peculiarities of available datasets.

- The earlier intertemporal microeconometric LS literature had a macro motivation: How important is substitution of work over time for business cycle fluctuations?

- From the macro perspective a year seemed a reasonable length of time for the short run. Nickell's opening remark in his 1985 World Congress lecture is an interesting quote.

- The new literature is more concerned with testing aspects of human behavior than with macro fluctuations.

- A worry is that when we look at labor changes at high frequencies, observed outcomes may reflect indivisibilities of labor. Fixed commuting costs and fatigue effects lead to optimal bunching of labor (Mulligan, 1998).

3. Data

- 584 trip-sheets for 21 drivers covering 13464 trips in total. Data are for particular dates in 1999–2001. No information on participation (number of days worked).

- The quality of the data raises some concerns (no meter checks, lots of missing observations). Also 5 drivers account for around 50% of total shifts.

- Most of the variation in daily hours of work is not due to driver fixed effects but within driver across days (same with income—which is inconsistent with income targeting).

- 93 percent of the trips are within Manhattan (median is 10 minutes, and median fare is $5.30).

- It is interesting to see that the hourly wage for each clock hour varies less over the day than the supply of driver hours, which suggests a supply and demand equilibrium outcome (number of drivers adjusting to the daily pattern of demand fluctuations).

- The conclusion is that while there is significant day-to-day variation in the hourly wage, most of the variation in the wage is unpredictable within-day variation.

4. Replicating CBLT results

- The author is skeptical that there is a constant daily wage to which drivers respond in choosing hours of work.

- The concern is that Camerer's equation is a bad approximation to a structural model of the drivers' decision rule.

- But we could still think of it as a "treatment effect equation" and try to establish reduced form causality from daily wage variation to hours worked.

- The problem is that we lack appropriate instruments and a good understanding of the variation in daily wages.

- Endogeneity of wages because of shifts in LS (Gerald Oettinger): What is the source of day-to-day variation in wages? Is it the result of the interaction of shifters in both the labor supply of drivers and demand for taxi services?

- Oettinger's point is that wages may be endogenous due to unobserved labor supply shocks u (e.g. varying numbers of drivers on the street across days), so that $Cov\,(w, u) < 0$, and OLS estimates are downward biased.

- Replication is reassuring, but it would be nice to know to what extent CBLT estimates are influenced by measurement error, reverse causality, or genuine income effects.

- We still do not know how much substitution in hours worked or on participation there is across days.

5. A direct implementation of the target earnings model

- The target of driver i on day d is measured by daily income minus one-half of the final fare.

- Farber finds that the target varies too much within drivers across days.

- If income is not net of gas costs, and drivers use a net income target, a greater variability in gross income would be consistent with targeting behavior.

- Could excess variability in "targets" be partly driven by part-time full-time participation variation across days? Apparently some drivers have secondary jobs.

6. Modeling hours as an optimal stopping problem

- Let T be time worked in a daily shift:
$$\Pr\left(T = \tau \mid T \geq \tau\right) = h\left[\tau, y\left(\tau\right), \sum_j \delta_j w_\tau^e\left(\tau + j\right)\right].$$

- Farber predicts a $(+)$ effect of τ, no effect of income $y\left(\tau\right)$, and a $(-)$ effect of earning opportunities $\sum_j \delta_j w_\tau^e\left(\tau + j\right)$.

- In contrast, the target model predicts no effect of τ and a positive effect of $y\left(\tau\right)$, at least when close to target. Also a $(+)$ effect of $\sum_j \delta_j w_\tau^e\left(\tau + j\right)$.

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7. Interpreting the estimated probit model

- The probit estimated in the paper is a model of the hazard of stopping after a certain number of trips.

- So in a way it is more of a model of choice of number of trips than a model of choice of hours (or minutes) of work.

- To see this, let T_{id} be the number of trips made by driver i on day d. The hazard $h_{id}(t)$ is the probability that $T_{id} = t$ conditional on $T_{id} \geq t$. Also

$$\Pr(T_{id} = t) = h_{id}(t) \prod_{s=1}^{t-1} [1 - h_{id}(s)].$$

Thus, the log likelihood is

$$L = \sum_{i,d} \ln \Pr(T_{id})$$

$$= \sum_{i,d} \left\{ \ln h_{id}(T_{id}) + \sum_{s=1}^{T_{id}-1} \ln [1 - h_{id}(s)] \right\}.$$

Letting $y_{ids} = \mathbf{1}(T_{id} = s)$ and choosing a probit specification for $h_{id}(s)$, we get the binary choice likelihood:

$$L = \sum_{i,d} \sum_{s=1}^{T_{id}} \{y_{ids} \ln h_{id}(s) + (1 - y_{ids}) \ln [1 - h_{id}(s)]\}.$$

- An alternative formulation would be to model directly shift duration in discrete intervals (e.g. 10 minute intervals) or in continuous time.

- It may make little difference in practice whether we look at work time hazards or trip hazards, but the former seem closer to the optimal stopping problem.

- Also, there is nontrivial within-day variation in waiting minutes and trip minutes, and the distribution of fares is fairly concentrated. As a result, choice of number of trips may become worryingly close to choice of shift income.

- In fact, the hazard of stopping after a given amount of working time could be made to depend on number of trips to that point (and their length) as a close alternative to income earned to that point.

8. Other comments on the duration model

- Endogeneity of income is another worry. If there are unobserved determinants of earnings opportunities for the rest of the day, and they are correlated with income made so far, the income coefficient will be biased.

- A problem of reduced form modelling of earning opportunities (based on driver, date, and hour-day effects) is that we do not get a direct estimate of their effect.

- One could model earnings opportunities by modelling the arrival rates of trips and trip times by clock hour and calendar date.

- If there is heterogeneity in targets, the income effect in the probit model may be driver specific.

9. Concluding remarks

- Settling the issue requires more data to understand the day-to-day variation in supply and demand.

- Data on demand for cab leasing from the leasing companies would be interesting, as well as changes in the number of corporate taxi driving licences (if any).

- Testing of unorthodox propositions in behavioral economics is an exciting agenda, but as in any other empirical area, eventual credibility depends on ability to survive careful scrutiny by others.

- In this respect, Farber's paper makes a significant contribution to the scrutiny of the income targeting hypothesis.

- After reading the paper, I asked a taxi driver in Madrid whether he had a daily income target. The answer was a definitive no. He thought this was not a good rule, and that he would rather stick to an hours target.