ISSN 0143-4543

Centre for European Labour Market Research

A Note on the Labour Supply Behaviour of NYC Cabdrivers: Does Experience Count?

By

Tim Barmby

Discussion Paper 2004-03
March 2004

Editor: Dr W David McCausland
www.abdn.ac.uk/business/

A Note on the Labour Supply Behaviour of NYC Cabdrivers: Does Experience Count?

Tim Barmby (University of Aberdeen)[1]

March 2004

I. Introduction

In a much talked about paper, Camerer, Babcock, Lowenstein and Thaler (1997), (hereafter CBLT) outline some potentially cautionary news about the intertemporal labour supply hypothesis. The basis of their paper is that cab drivers will face day to day variation in their wage rates due to a variety of factors (weather, subway breakdowns etc) which will affect demand, but that this variation is transitory. Their main conclusion is that there is some possibility that New York cabdrivers, who are the subject of their paper, might make their decisions one day at a time, using a daily income target. Chou (2002) in another paper looking at taxi divers in Singapore arrives at very similar conclusions. CBLT do take pains to point out that their result should be treated with some caution. However target income behaviour, of course, generates predictions which are counter to the intertemporal labour supply hypothesis, as on high wage days the cabdrivers will hit the income target earlier and work fewer hours.

[1] Tim Barmby, Centre for European Labour Market Research, Department of Economics, University of Aberdeen, Old Aberdeen, Scotland AB24 3QY tim.barmby@abdn.ac.uk

This short note looks at some of the CBLT data again and suggests that certain conclusions of the original article may be modified, particularly with respect to the effect of level of experience of the cabdriver, as the title suggests.

II. Data

The data[2] used in this reanalysis is the sample of fleet drivers, (the TRIP sample in the original CBLT article). This is a small panel of N=13 NYC cabdrivers who work between T=1 and T=11 days during the period 25th April -14th of May in the spring of 1994, this makes NT= 70 cabbie-days in total. Hours worked is computed by using information from the trip sheet on which the cab driver records the fares which were obtained during the day, the measure of hours is the difference between the time at which the first fare was recorded as being picked up and the recorded time of the last fare being dropped off.

Hourly wage is computed by dividing total daily earnings by hours and so, as is well known, there is a potential for division bias, see Borjas (1980) and an Appendix of this paper, which will bias the wage effect downwards. The bias results from the possible existence of measurement error in hours, one possible source of this in the present context, considering how the observation on hours is obtained, is if some trips (and in particular the last, or first) are not entered on the trip sheet. CBLT are able to observe the number of trips independently of the trip sheet by a counting device o the meter. They use this information to screen out those drivers whose trip sheets record more than two trips less than that indicated on the meter. On average two trips would be a around a 7% error.

If the wage is correctly instrumented then this bias can be removed. Farber (2003) raises some questions as to whether the wage instrumentation in CBLT successfully achieves this. By constructing a more extensive specification for the wage instruments I show in this paper that the main conclusion of the CBLT paper loses some support. The wage instrumenting equation which CBLT use regresses the natural

---

[2] I would like to thank Linda Babcock for making available the data

log of wage on the 25th 50th and 75th percentile of the distribution of the other wages in the sample together with dummies for aspects of the weather and shift the cab driver was working. When this instumented wage is used in the labour supply equation the wage elasticity is not significantly different from zero. CBLT then split the sample by hack number to see whether the effect is different for “more experienced” drivers. Hack numbers are allocated sequentially as cab drivers obtain licenses, so higher numbers indicate less experience drivers CBLT split the sample at the median hack number. In CBLT’s table IV they find that the experienced subsample have a positive but insignificant coefficient.

I find that this result is sensitive to the way in which the wage equation is specified if the CBLT specification is augmented by fixed effects for days and their variable for endtime (the time at which the last fare is dropped off), and offtrip (the number of fares recorded on the meter), more experienced drivers appear to have a significantly positive labour supply elasticity at least for the TRIP subsample. These labour supply results are reported in Table 1. The importance of fixed effects for days is essentially the conjecture of Farber[3].

Table 1: Estimated IV Labour Supply Schedules with fixed effects for drivers

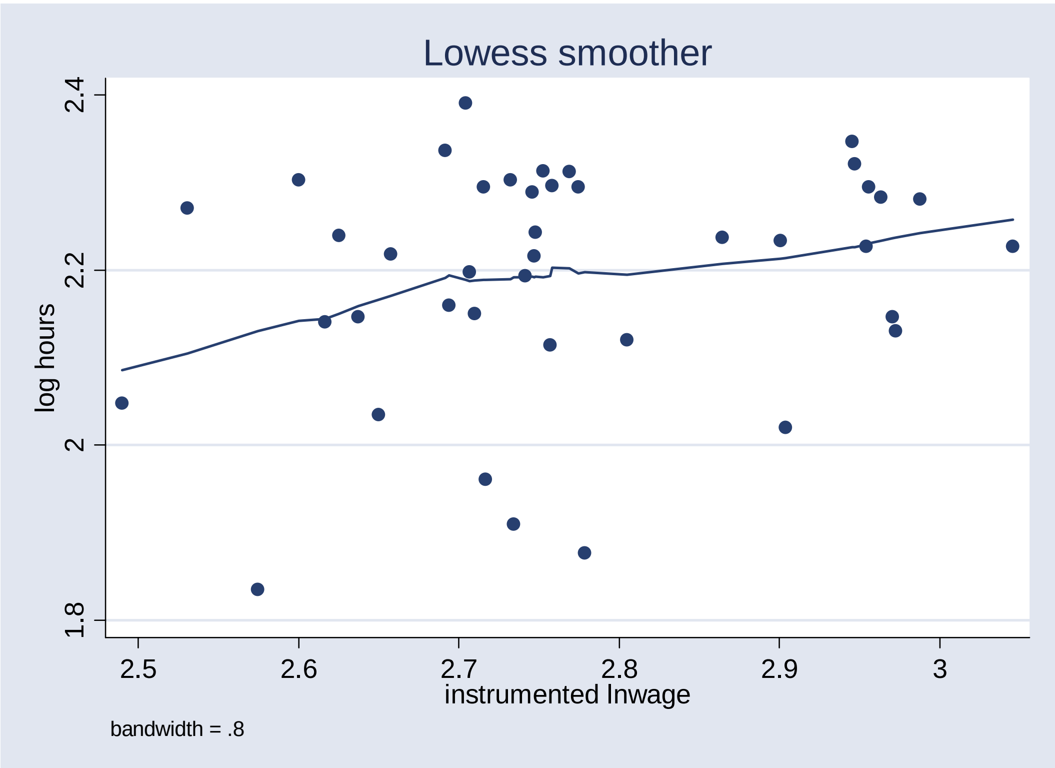
Variable	Coefficient	SE	Coefficient	SE
	CBLT wage instrument		Augmented wage instrument	
Constant	2.3332	0.9006	1.1016	0.6124
LnWage (IV)	-1.0123	1.4665	-0.8230	0.4760
LnWage*Exp (IV)	1.7607	2.4750	1.5754	0.7069
High	-0.0014	0.0025	-0.0014	0.0022
Week	-0.0266	0.0457	-0.0255	0.0400
Rain	-0.0287	0.0624	-0.0326	0.0442
Shift	0.0384	0.0628	0.0325	0.0594
F test (F, P value)	0.47, 0.4937		4.48, 0.0342	
R^2	0.0017		0.0020	

[3] Farber also did a hazard type analysis of stopping work, which I was not able to do here as I didn’t have access to the original trip sheets from the CBLT paper

The reported F test values are for the Null hypothesis that the sum of the coefficients on wage and the wage-experience interaction is equal to zero, that is the wage elasticity is zero for experienced drivers. As the results indicate we are unable to reject this using CBLT's wage instrument equation, but are easily able to do this for the augmented instrumenting equation described in the text. This result put the general message of the earlier paper in a slightly different light. Entering the new instruments sequentially gives the following fall in the P value:- fixed effects for days, P = 0.0642, fixed effects for days and endtime, P=0.0552.

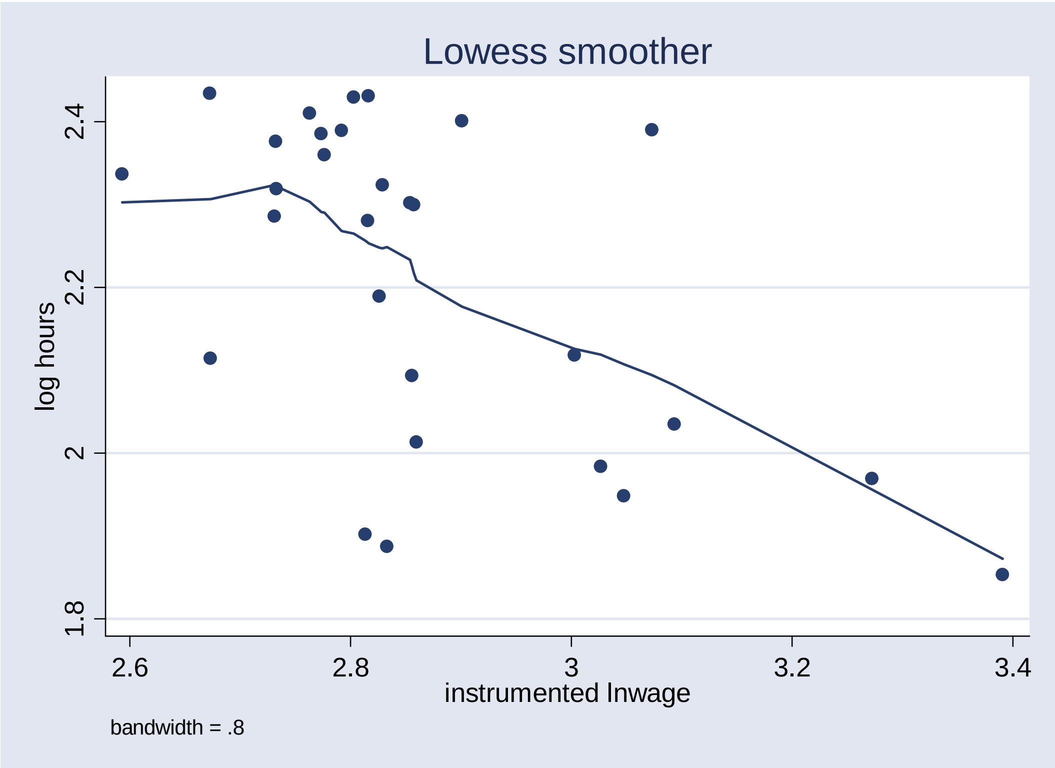
Since there seemed to be clear variation in the size of the elasticity across drivers, I examined, using some simple non-parametric regressions the variation of the estimated elasticity over the range of values the instrumented log daily wage takes. This reveals the following patterns for the experienced and inexperienced sub samples.

Figure 1a : Labour Supply Schedule for experienced drivers



As you would expect there is some visual confirmation of the positive effect of wage for experienced drivers in the plot reported in figure 1a. The estimated line seems approximately linear with a change in log hours of around 0.15 corresponding to a change in log wage of 0.5 (all logs are natural logs) implying an elasticity of around 0.3. The pattern in the less experienced sample appears quite different as the next plot shows

Figure 1b : Labour Supply Schedule for inexperienced drivers

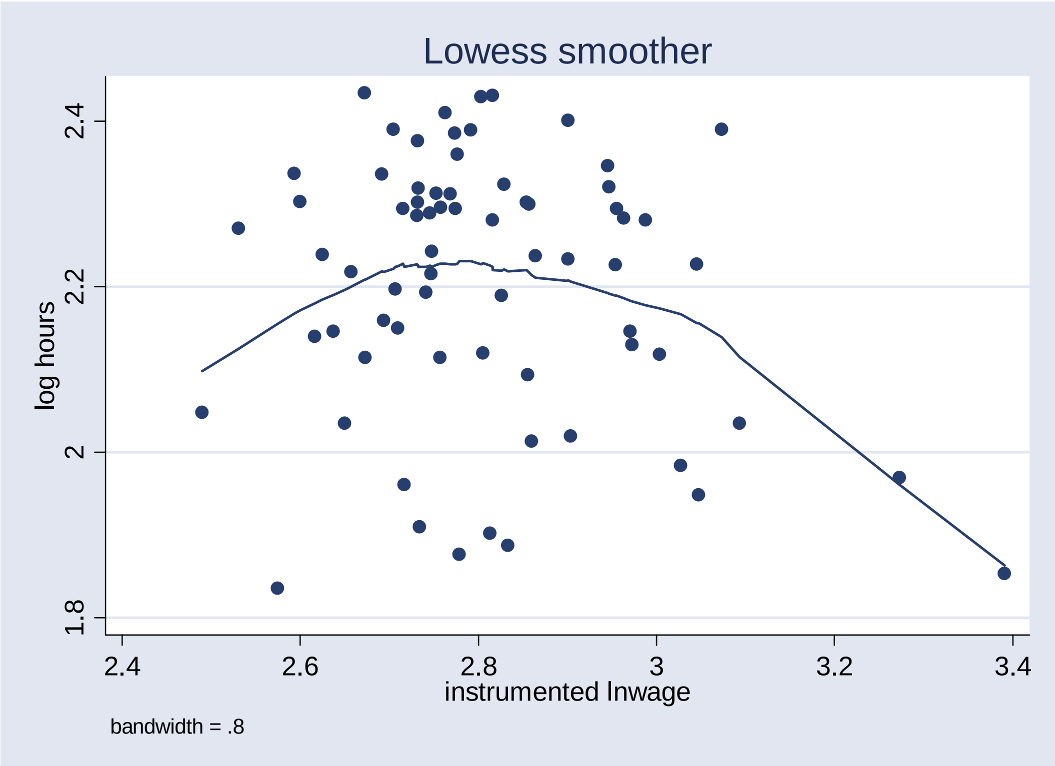


In plot 1b for the inexperienced drivers there appears two distinct groups:- those above log hours of around 2.2 and those below, with some suggestion that the second group might well be contributing the bulk of the negative effect.

It seems at least possible that these cab drivers observing that, say, the weather is bad on a particular day and that the demand for cab rides will be high, hire a cab later in the day in a speculative fashion. Why they then don’t follow through and work longer hours is however unclear, one explanation might be that they hold second jobs.

Finally the labour supply schedule for the whole sample is reported for completeness, and the variation of the labour supply effect is clear

Table 1c Labour supply schedule for all workers



IV Conclusion

This short note undertakes a reanalysis of the one of the samples of labour supply behaviour of New York cab drivers used by Camerer, et al (1997). Following a conjecture made by Farber(2003) it shows that the way in which the wage is instrumented does have some influence on the results obtained particularly with respect to the effect of experience.

References

Borjas G J (1980) “The Relationship between Wages and Weekly Hours of Work: The Role of Division Bias” Journal of Human Resources Vol 15(3) pp 409-23
Camerer C, Babcock L, Loewenstein G and Thaler R (1997) “Labor Supply of New York Cabdrivers: One Day at a Time” *The Quarterly Journal of Economics* Vol 112 pp 407-41.
Chou Y K (2002) “Testing Alternative Models Labour Supply: Evidence from Taxi Drivers in Singapore” *Singapore Economic Review* Vol 47(1) pp 17-47
Farber H (2003) “Is Tomorrow another day ? The Labor Supply of New York Cab Drivers” NBER Working Paper 9706

Appendix: Division Bias

“Divison Bias” arises in the following way $\ln H^* = \alpha + \beta \ln W^* + u \quad H^* = Hv \quad W^* = \frac{E}{H^*}$ an asterisk indicates that the variable is measured with multiplicative measurement error *v*. The estimation problem can be seen by considering the OLS estimation of β in the above and remembering what we want to recover is $\tilde{\beta}$ in $\ln H = \tilde{\alpha} + \tilde{\beta} \ln W + e$ the estimated slope in the equation without measurement error.

$$\hat{\beta} = \frac{Cov(\ln H^* \ln W^*)}{Var(\ln W^*)} = \frac{E[(\ln H^* - E(\ln H^*))(\ln W^* - E(\ln W^*))]}{E[(\ln W^* - E(\ln W^*))^2]}$$

$$= \frac{E[(\ln H + \ln v - E(\ln H + \ln v))(\ln W - \ln v - E(\ln W - \ln v))]}{E[(\ln W - \ln v - E(\ln W - \ln v))^2]}$$

$$= \frac{E[((\ln H - E(\ln H)) + (\ln v - E(\ln v)))((\ln W - E(\ln W)) - (\ln v - E(\ln v)))]}{E[((\ln W - E(\ln W)) - (\ln v - E(\ln v)))^2]}$$

$$= \frac{E[(\ln H - E(\ln H))(\ln W - E(\ln W))] - \sigma_v^2}{\sigma_w^2 + \sigma_v^2}$$

$$\hat{\beta} = \frac{\sigma_w^2 \tilde{\beta}}{\sigma_w^2 + \sigma_v^2} - \frac{\sigma_v^2}{\sigma_w^2 + \sigma_v^2}$$

as the variability of the measurement error increases relative to the variability in the explanatory variable, wage, the estimated elasticity tends to -1.