HW2 Econometrics 3

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Problem 2

Problem 2. Censoring/Truncation. Greene (2007) analyzed the de- fault behavior and monthly behavior of a large sample of credit card users (13,444).

(2.1)

Estimate the following model

$$\log spend = \beta_1 + \beta_2 \ln income + \beta_3 Age + \beta_4 Adepcnt + \beta 5 ownrent + \varepsilon$$

Table 1: Regression output used to answer Problem 2

	Dependent variable:		
	LOGSPEND		NA
	OLS	*censored regression*	*Heckman selection*
	(1)	(2)	(3)
Ln_income	1.121***	1.117***	0.907***
	(0.033)	(0.033)	(0.162)
AGE	−0.015***	−0.014***	−0.014***
	(0.001)	(0.001)	(0.002)
ADEPCNT	−0.027**	−0.027**	0.016
	(0.011)	(0.011)	(0.034)
OWNRENT	−0.203***	−0.201***	−0.281***
	(0.030)	(0.030)	(0.065)
logSigma		0.296***	
		(0.007)	
Constant	−3.363***	−3.340***	−1.419
	(0.243)	(0.246)	(1.458)
Observations	10,499	10,499	13,444
R^2	0.105		0.105
Adjusted R^2	0.104		0.104
Log Likelihood		−18,012.210	
Akaike Inf. Crit.		36,036.430	
Bayesian Inf. Crit.		36,079.980	
ρ			−0.608
Inverse Mills Ratio			−0.878 (0.646)
Residual Std. Error	1.330 (df = 10494)		
F Statistic	306.358*** (df = 4; 10494)		
Note:			*p<0.1; **p<0.05; ***p<0.01

(2.1.a)

Using OLS. What is the effect of 10% increase in income on credit card expenditure?

- Since we are dealing with log-log we can simply multiply the paramater estimate on income by ten, which gives 11.2120776. So a 10% increase in income is estimated to increase credit card spending by 11.2120776%.

(2.1.b)

Using Censored regression. What is the effect of 10% increase in income on credit card expenditure?

We will need to employ a Censored (Tobit) Regression and calculate the Partial Effects.

The general formulation for the Tobit Model (Greene 7th. ed., pg 848):

$$
\begin{aligned}
{y_i}^* &= {x_i}'\beta + \varepsilon_i \\
y_i = 0 \quad &\begin{cases} \text{if } {y_i}^* \leqslant 0 \\ \text{if } {y_i}^* \geqslant 0 \end{cases} \\
y_i = {y_i}^* \quad &
\end{aligned}
$$

The proper Partial Effects formula:

$$\frac{\partial E[y|x]}{\partial x} = \beta \Pr ob[a < y^* < b]$$

Where I compute the partial effect at each observation and then compute the mean.

The parginal effect of Ln_income on LOGSPEND is 1.1169911. Therefore, a 10% increase of income is estiimated to increase credit card spending by 11.169911.

(2.1.c)

Using Heckman Two-Step Estimator. What the is effect of 10% increase in income on credit card expenditure?