Problem Set #4

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1. Table 1 below displays the results of the probit estimations, which are conducted in edgel_ps4.do.

Table 1

	(1) $\mathbb{1}\{WalMart\}$	(2) $\mathbb{1}\{KMart\}$
$\mathbb{1}\{KMart\}$	-0.476	
	(0.100)	
$\mathbb{1}\{WalMart\}$		-0.326
		(0.098)
% Urban	1.820	1.733
	(0.170)	(0.206)
$\log(Population)$	1.641	1.562
	(0.076)	(0.096)
$\mathbb{1}\{Midwest\}$	0.983	0.568
	(0.131)	(0.139)
$\mathbb{1}\{South\}$	1.302	0.085
	(0.130)	(0.138)
Pseudo R^2	0.390	0.350
Log-likelihood	-872	-653
Obs.	2,065	2,065

Standard errors in parentheses; both specifications include an unreported intercept

The biggest weakness of this model is that it does not account for the timing of entry between each firm and the fact that each firm is choosing to enter strategically, based on whether and when the other firm enters. Specifically, these decisions are not modeled as simultaneous equations, even though they fundamentally are. Furthermore, this omits key profit determinants, such as household income and the number of small firms

prior to entry.[1]

2. Yes, distance to Benton County, Arkansas can be used as an instrument for WalMart's entry. Since WalMart was founded in Benton County, WalMart is more likely to expand to nearby counties, *ceteris paribus*, since it has more information about those markets than is captured by observable covariates, and it pays a lower fixed cost for adapting its supply chain to service those markets. Furthermore, WalMart's preponderence in Benton County and its environs implies that, in such counties, it likely entered prior to KMart, thus enabling the coefficient on WalMart's existence in a county to accurately reflect the causal effect of WalMart's entry on KMart's entry.

3. The results for each ordered probit estimation are in table 2 below.

Table 2

	# Large	# Total
% Urban	1.973	-0.207
	(0.149)	(0.107)
$\log(Population)$	1.786	1.464
	(0.065)	(0.045)
$\mathbb{1}\{Midwest\}$	0.890	-0.105
	(0.115)	(0.087)
$\mathbb{1}\{South\}$	0.886	0.526
	(0.112)	(0.085)
Pseudo R^2	0.390	0.148
Log-likelihood	-1255	-4101
Obs.	2,065	2,065

Standard errors in parentheses

The main limitation of this model is that it treats all firms as homogenous. The profit shock for WalMart entering a market with just a KMart is the same as WalMart entering the same market with just a small local business, which is treated the same as a small local business entering the same market with a pre-existing WalMart (in the case of the total players specification). In reality, WalMart in 2021 is still one of the world's largest firms, while KMart is two bankrupcies deep into its decline. These firms are clearly not homogenous.

4. In the Bertrand-Nash equilibrium of the entry game, each firm i enters if:

$$x_{im}\beta_i + \Delta_i y_{-i} + \varepsilon_i \geq 0$$

[1]The author's data do include such variables, but without a common identifier betwwen data78.out and XMat.out, we cannot merge the two files.

Where y_{-i} equals one if the competing firm enters market m. In equlibrium, firm i's belief that the other firm enters m is consistent. Thus, following Bajari et al. (2012), the first stage predicts entry probability with probit as in (b), and the second stage uses the results from the first stage in the place of the entry dummy from the first stage. The point estimates for each stage are diplayed in table III below.

	1st Stage		2nd Stage	
	(1)	(2)	(3)	(4)
	$\mathbb{1}\{WalMart\}$	$\mathbb{1}\{KMart\}$	$\mathbb{1}\{WalMart\}$	$\mathbb{1}\{KMart\}$
Δ_i	-0.297	-2.308	-4.825	-5.249
$\log(Dist)$	-0.933		-0.639	
% Urban	-0.933	1.967	-0.639	4.108
$\log(Population)$	1.933	1.809	3.668	3.915
$\mathbb{1}\{Midwest\}$	1.778	0.787	3.308	1.790
$\mathbb{1}\{South\}$	0.146	0.660	1.052	1.738
Log-likelihood	-786	-1465	-714	-550
Obs.	2,065	2,065	2,065	2,065

The second stage regression clearly dominates the first stage regression in terms of fit and the economic significance of the coefficient of interest, particularly for K-Mart's regression. These results suggest that the two firms engage(d) in strategic entry to a much greater extent than a naive probit regression would suggest.

To calculate the variance-covariance matrix for the set of coefficients (and thus the standard errors), we would use the 2SLS or GMM matrix, treating entry as an endogenous variable.