Handout for "Productivity Dispersion and Plant Selection in the Ready-Mix Concrete Industry"

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	CMF	ASM	LBD
Collection	Questionnaire	Questionnaire	IRS Tax Data
Years	Every 5 years	1972-2000	1976-1999
Entry/Exit/Payroll	X	30%	X
Input and Output Data	X	30%	X

Table 1: Description of Census Data Sources

	OLS		Fixed Effect		First-Stage ACF	
Log Shipments	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Constant	1.709	(0.033)	1.896	(0.058)	1.0780	(0.2003)
Salaries	0.271	(0.005)	0.238	(0.007)	1.0136	(0.0676)
Total Assets	0.070	(0.004)	0.034	(0.004)	0.1270	(0.0231)
Cost of Materials	0.595	(0.005)	0.596	(0.008)	0.0840	(0.0909)
Investment					0.0398	(0.0231)
Log RMC Plants in County					-0.0283	(0.0405)
Squared and Cubed Interactions					Yes	
Year Effect	X		X		X	
Plant Fixed Effect			X			
F	5355		1247.46		2491	
R2	0.9413		0.876		0.97	
Plants			4256			
Observations	9049		9049		4338	

Table 2: OLS, Fixed Effect and First-Stage Regression of the Ackerberg-Caves-Frazer procedure.

	OLS		Ackerberg, Caves and Frazer	
Log Shipments	Coefficient	Standard Error	Coefficient	Standard Error
Constant	1.709	(0.033)		
Salaries	0.271	(0.005)	0.186	
Assets	0.070	(0.004)	0.018	
Materials	0.595	(0.005)	0.753	
Year Effects	X		X	
GMM Criterion				
Observations	9072			

Table 3: Ackerberg, Caves and Frazer estimates of productivity.

| Percentile	Dispersion due to		
	TFP (ρ_q)	Productivity (ω_q)	Measurement (ϵ_q)
10%	1.7	1.8	1.8
25%	1.8	1.9	1.9
50%	2.0	2.0	2.0
75%	2.3	2.2	2.3
90%	2.9	2.3	2.6

Table 4: Dispersion of Predicted Output due to TFP dispersion, true productivity, and measurement error (in millions of dollars).

From	To	
	Low Productivity	High Productivity
Out	0.49	0.51
Low Productivity*	0.71	0.29
High Productivity**	0.21	0.79

* Low Productivity is productivity below the median for the year
*High Productivity is productivity above the median for the year

Table 5: Productivity exhibits limited persistence.

Age and Productivity
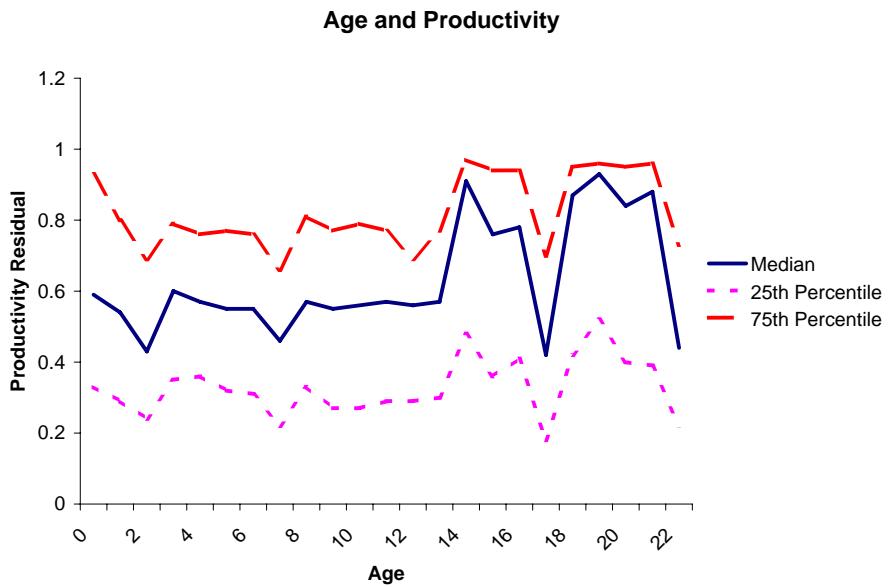
Figure 1: Plant Productivity shows little change as it ages.

Survey Year	Median Employees	Median Cubic Yards Per Plant	Median Cubic Yards Per Worker	Median Cubic Yards Per Worker Hour
1963	8	15000	1900	1.4
1967	14	26000	2100	1.6
1972	15	35000	2200	1.6
1977	13	33000	2300	1.7
1982	13	25000	2000	1.4
1987	15	36000	2700	1.7
1992	13	32000	2600	1.7
1997	13	40000	3000	1.7

Table 6: The ready-mix concrete sector has experienced little productivity growth.

		To		
From		Out	Small	Large
Out		99.1%◇	0.9%	0.0%
Small+	Low Productivity*	8.5%	86.2%	5.3%
	High Productivity**	3.8%	89.9%	6.3%
Large++	Low Productivity	2.3%	15.2%	82.4%
	High Productivity	1.8%	13.2%	84.9%

+ Small: Plant with fewer than 15 employees.
++ Big: Plant with at least 15 employees.
*Low Productivity: Productivity below the median for the year.
**High Productivity: Productivity above the median for the year.
◇Number of Entrants is 6 minus the number of active firms in the county.

Table 7: Low productivity plants are less likely to grow than high productivity plants.

	I	s.e.	II	s.e.
Fixed Cost Group 1†	1.06	(0.41)	-0.53	(0.10)
Fixed Cost Group 2	1.42	(0.41)	-0.35	(0.11)
Fixed Cost Group 3	1.42	(0.39)	-0.32	(0.11)
Fixed Cost Group 4	1.11	(0.43)	-0.35	(0.13)
Decrease in Fixed Costs for High Productivity Firms	1.19	(0.27)	0.86	(0.17)
Log of Construction Employment	0.05	(0.02)	0.03	(0.01)
1st Competitor*	-1.74	(1.11)	-0.61	(0.07)
2nd Competitor	0.08	(0.20)	0.07	(0.11)
3rd Competitor	0.01	(0.20)	-0.07	(0.15)
More than 3 Competitors	0.34	(0.51)	0.04	(0.10)
Sunk Cost of Entry	-5.55	(0.09)	-5.45	(0.08)
Equilibrium Conditional Choice Probabilities			X	
Log-Likelihood	-3625.47		-3599.05	
Observations	235 000		235 000	

*The effect of competition displayed is the marginal effect of each additional competitor.
† Markets are classified into groups 1 to 4 based on the average number of
plants in the market from 1976 to 1999, which is rounded to the nearest integer.
I: Hotz and Miller technique with market heterogeneity.
II: Aguirregabiria and Mira technique with market heterogeneity.

Table 8: Dynamic Entry Model with Exogenous Productivity.

Average Shipments (in thousands)	Birth	Continuer	Death
1977	461	1,164	402
1982	1,045	1,503	520
1987	1,241	2,307	601
1992	1,509	2,218	1,417
1997	1,559	3,293	1,358

Average Capital (in thousands)	Birth	Continuer	Death
1977	217	491	185
1982	403	598	187
1987	549	1,050	270
1992	565	1,131	632
1997	728	1,992	770

Average Salaries (in thousands)	Birth	Continuer	Death
1977	83	211	83
1982	185	269	83
1987	205	413	101
1992	257	428	267
1997	243	567	241

Table 9: Characteristics of Plants that are Births, Deaths and Continuers
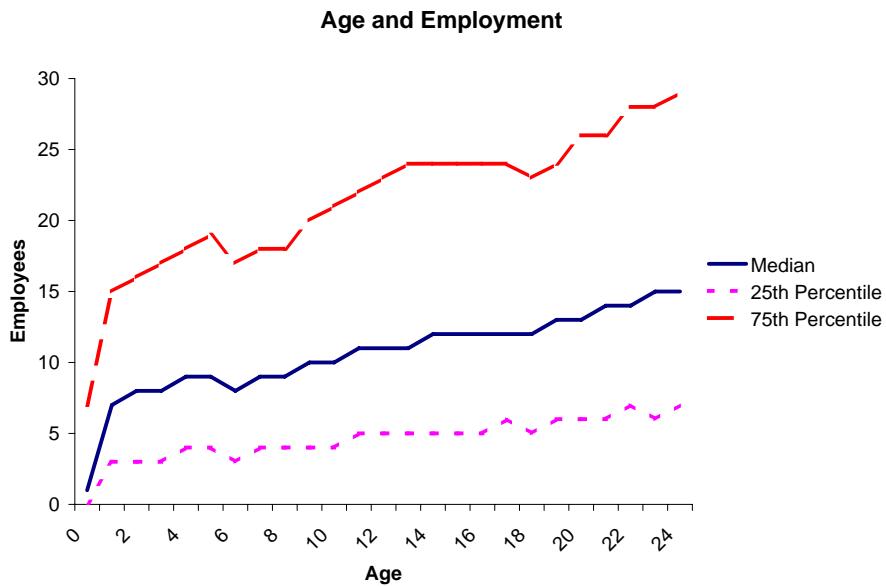
Figure 2: Average plant employment rise slowly after the first year in operation.

	Observations	Mean	Standard Deviation	5th Percentile	95th Percentile
Fraction in LBD concrete sic	187825	0.78	0.33	0	1
Fraction in Asm/Cmf concrete ind	187915	0.92	0.22	0.33	1
Total Value of Shipments (in 000's)	70566	3380	25643	41	11000
Total Employment	70566	26	147	1	82
Administrative Record Flag	70622	0.13	0.34	0	1
Building Assets Ending (in 000's)	51246	153	1885	0	420
Cost of Fuels (in 000's)	70566	42	245	0	150
Cost of Resales (in 000's)	70566	115	1621	0	430
Cost of Contract Work (in 000's)	70566	22	235	0	37
Cost of Purchased Electricity (in 000's)	70566	29	236	0	75
Total Value of Inventory (in 000's)	11598	116	3702	0	140
Machinery Assets Ending (in 000's)	51246	754	4463	0	2700
Machinery Depreciation (in 000's)	51246	55	478	0	220
Materials Inventory Ending (in 000's)	70566	151	7204	0	250
Machinery Rents (in 000's)	57073	12	95	0	42
Machinery Retirements (in 000's)	51246	24	238	0	78
Multi-Unit Flag, MU=label	70622	0.51	0.50	0	1
Total New Expenditures (in 000's)	70566	148	1625	0	510
New Machinery Expenditures (in 000's)	70566	128	1351	0	460

Table 10: Summary Statistics for Plant Data

	Marginal Effect from Probit			
	I	II	III (preferred)	IV
2nd Quintile of Productivity	2.55%	-0.29%	-0.34%	1.63%
	(0.47%)	(0.31%)	(0.31%)	(0.42%)
3rd Quintile of Productivity	1.46%	-1.25%	-1.40%	0.77%
	(0.42%)	(0.29%)	(0.29%)	(0.38%)
4th Quintile of Productivity	-0.28%	-1.77%	-1.74%	-0.59%
	(0.39%)	(0.30%)	(0.30%)	(0.38%)
5th Quintile of Productivity	-1.07%	-2.21%	-2.26%	-1.33%
	(0.44%)	(0.31%)	(0.30%)	(0.37%)
Multi-Unit Status	-4.17%	-4.32%	-4.31%	-4.26%
	(0.26%)	(0.26%)	(0.26%)	(0.26%)
Employment	-0.09%	-0.10%	-0.10%	-0.10%
	(0.01%)	(0.01%)	(0.01%)	(0.01%)
No AR Records			X	
No Hot Imputes		X		
No ASM Years	X			
Pseudo-R2	7.28%	6.95%	6.98%	7.00%
Log Likelihood	-4480.19	-4495.71	-4492.29	-4492.55
Observations	24393	24393	24393	24393
Baseline Exit Probability	3.73%	3.76%	3.75%	3.75%

Table 11: The relationship between productivity and exit is monotonic even after controlling for plant characteristics and dropping AR or hot imputes.

County Fixed-Effect Negative Binomial Regression

Number of observations	29670	
Number of groups	1777	
Log likelihood	-6223	

Plant Births in a county	Coefficient	Standard Error
Fraction of Plants with less than 10 employees	1.22	0.08
Fraction of Plants with more than 25 employees	-0.54	0.10
Fraction of Plants in the lowest tercile of productivity	-0.12	0.12
Fraction of Plants in the top tercile of productivity	-0.66	0.10
Fraction of Plant that exit this period	-0.42	0.10
Log of Employment in the Concrete Sector	-0.97	0.04
Change in Log of Employment in the Construction Sector	0.00	0.04
Change in Log of Employment in the Concrete Sector	1.01	0.03
Log of Employment in the Construction Sector	-0.34	0.15
Log of Concrete Plants in the county	9.17	0.40
Square of Log of Employment in Construction Sector	0.05	0.01
Square of Log of Concrete Plants	-1.53	0.14
Year Fixed Effects	Yes	
Constant	10.29	94.54

Table 12: The presence of productive plants deters entry.

	Output Measure		
	Log Value Added	Log Shipments	Log Cubic Yards of Concrete
Log Salaries	0.633	0.270	0.138
	(0.006)	(0.003)	(0.012)
Log Assets	0.269	0.116	0.084
	(0.006)	(0.003)	(0.010)
Log Materials		0.587	0.689
		(0.003)	(0.011)
Constant	1.163	1.170	4.366
	(0.022)	(0.011)	(0.042)
Observations	22114	21941	15636
R2	74%	94%	58%

Table 13: Production function regressions with different output measures.