

Empirical Results for the Effect of Mergers and Acquisitions on Plant Closures

The estimated coefficients for the probability of ownership change for 1977-82 are negative for the three meat and poultry industries and the fluid milk, feed, and oilseed industries (tables 4, 5, and 6). In four of those instances, the coefficient is also significant. The interaction of plant size and acquisitions is opposite that from acquisitions alone in all industries, except fluid milk and feed. The pattern is distinctly different for 1982-87. Ownership change has a positive effect on plant closures in all industries, except feed and oilseeds. The sign on the coefficient for the interaction of acquisitions and plant size reverses itself for all the industries.

These statistical results suggest that the merger waves of 1977-82 and 1982-87 were distinctly different and match anecdotal evidence. Meat-packing and meat processing underwent a major transformation in the earlier period, as entrants and upstarts replaced many well-established, large manufacturers. As a result, many large factories came onto the merger market and many of these were outdated. At the same time, growth in per capita beef and pork consumption dropped, making production cutbacks necessary. The inevitable result was a massive industrial consolidation with an unusually high number of large plants being shut down. Similar fates befell fluid milk and feed (the feed industry is directly tied to the slaughter industry through ownership and supply links).

Results on plant closures differ from McGuckin et al. (1997) in that they found that acquired plants were consistently less likely to be closed, whereas we find that to be the case only for smaller meat and poultry, fluid milk, and feed plants for 1977-82 and larger plants in all industries, except feed and oilseeds for 1982-87. One major difference between the studies is that we use narrowly defined industries; so, we can control for more industry-specific characteristics.

Results also show that during 1982-87 large plants in all industries with higher labor cost shares, except meat processing and milk, were more likely to exit their industries. For 1977-82, only large cheese, flour, feed, and oilseed plants with high labor costs were more likely to exit. The 1982-87 results make sense because large plants produce more commodity products that garner economies of scale that should yield lower labor costs and small plants tend to produce more niche products that require greater labor inputs. We attribute the difference for 1977-82 in meat and poultry to a shift in plant processing technologies in large plants away from the production of carcasses in multispecies plants to the production of boxed meat and poultry parts in single-species plants (MacDonald et al., 2000). Many of the large plants were designed for a different era in which large plants produced lower value carcasses that had lower labor costs and were not readily adaptable to a new environment in which large meat and poultry plants produced boxed meat and poultry parts. Eventually, many of the carcass producers either disappeared or changed their product mix as boxed meat and poultry parts came to dominate production from large slaughter facilities. See MacDonald et al. (2000) and Ollinger et al. (2000) for details of this shift.

Other findings are consistent with previous research. Similar to Dunne et al. (1989), plant size (employment) and plant size interacting with labor productivity negatively affected plant exits in 11 and 9 cases out of 16. Plant age also consistently discouraged plant exit, possibly because more experienced management could more readily adapt to the changing economic environment.

Table 4

Probit regression of plant closures for meat and poultry, 1977-82 and 1982-87

Dependent variable	1977-82			1982-87		
	Meatpacking	Meat processing	Poultry slaughter	Meatpacking	Meat processing	Poultry slaughter
Intercept	2.007*** (0.175)	1.600*** (0.234)	4.249*** (0.278)	-0.160 (0.158)	0.593*** (0.161)	0.403* (0.228)
Pr (AC)	-2.372*** (.760)	-3.847*** (.574)	-6.486*** (.689)	0.424 (0.571)	5.847*** (.676)	2.219** (1.077)
BUYER_PLANT	1.243*** (.146)	.766*** (.164)	.615*** (.141)	.222 (.141)	.115 (.125)	-.076 (.127)
Ln PROD	.473*** (.058)	.222** (.097)	1.013*** (.119)	-.089** (.038)	-.012 (.046)	.053 (.098)
Ln SIZE	-.480*** (.043)	-.668*** (.056)	-1.098** (.064)	.122** (.049)	-.371*** (.042)	.019 (.073)
Ln WAGE_SHARE	.478*** (.067)	.687*** (.111)	1.595*** (.129)	-.041 (.054)	-.266*** (.069)	.042 (.096)
AGE72	-.103*** (.021)	-.097*** (.029)	-.137*** (.039)	-.098*** (.027)	-.017 (.030)	-.100** (.043)
AGE77	n.a.	n.a.	n.a.	-.108*** (.032)	-.070** (.035)	-.054 (.048)
MULTI	.427*** (.134)	.338** (.140)	.635*** (.182)	.377** (.152)	.771*** (.134)	.547* (.336)
OUTSIDE ¹	-1.097*** (.157)	-.278*** (.031)	.072 (.147)	.159 (.173)	-.756*** (.179)	-1.579*** (.202)
NOT_FOOD	.003 (.793)	-1.137 (.207)	-1.025*** (.199)	.597** (.295)	.058 (.152)	1.457*** (.206)
Pr (AC)*Ln SIZE	.173 (.117)	.557*** (.106)	.707*** (.112)	-.206** (.088)	-.677*** (.116)	-1.014*** (.135)
BUYER_PLANT*Ln SIZE	-.192*** (.032)	-.060 (.038)	-.116*** (.031)	-.024 (.029)	.025 (.027)	.098*** (.027)
Ln PROD*Ln SIZE	-.090*** (.015)	-.092*** (.024)	-.275*** (.029)	.072** (.013)	-.017 (.013)	.053** (.024)
Ln WAGE_SHARE*Ln SIZE	-.064*** (.016)	-.183*** (.027)	-.362*** (.032)	.082*** (.016)	-.041** (.017)	.104*** (.027)
MULTI*Ln SIZE	.022 (.031)	.033 (.033)	-.039 (.039)	-.107*** (.031)	-.160*** (.029)	-.040 (.055)
OUTSIDE*Ln SIZE	.157*** (.034)	-.277*** (.031)	-.046 (.032)	-.073** (.036)	.028 (.035)	.456*** (.047)
NOT_FOOD*Ln SIZE	.150 (.130)	.356 (.047)	.304*** (.046)	-.198*** (.066)	.030 (.034)	-.409*** (.059)
Log likelihood	-12,779	-6,798	-3,768	-9,188	-8,718	-4,867
OBS	3,066	1,803	1,276	2,090	2,108	1,169

Numbers in parentheses = Standard errors. n.a. = Not applicable. *, **, and ***Significant at 90-, 95-, and 99-percent levels. Notes: Dependent variable = Plant closure (1,0). ¹OUTSIDE = One for plants outside the industry in question (meatpacking, meat processing, and poultry slaughter and processing) and zero otherwise.

Table 5

Probit regression of plant closures for dairy, 1977-82 and 1982-87

Dependent variable	1977-82		1982-87	
	Cheese	Fluid milk	Cheese	Fluid milk
Intercept	0.616* (0.351)	1.750*** (0.152)	2.698*** (0.350)	0.613*** (0.240)
Pr (AC)	.529 (.839)	-.555 (.847)	5.137*** (.776)	.988 (.884)
BUYER_PLANT	-.896*** (.208)	.266** (.126)	.918*** (.189)	.902*** (.139)
Ln PROD	-.061 (.122)	.089 (.067)	-.605*** (.089)	-.240*** (.073)
Ln SIZE	-.289*** (.087)	-.432*** (.037)	.678*** (.095)	-.286*** (.065)
Ln WAGE_SHARE	.043 (.123)	.432*** (.067)	-.797*** (.113)	.178** (.092)
AGE72	-.031 (.044)	-.171*** (.028)	-.077* (.044)	-.096*** (.037)
AGE77	n.a.	n.a.	-.196*** (.056)	-.093 (.047)
MULTI	.791*** (.173)	.618*** (.122)	.937*** (.200)	.830*** (.148)
OUTSIDE ¹	-.352 (.250)	-.895*** (.124)	-1.726*** (.276)	-.846*** (.195)
NOT_FOOD	-3.772*** (.890)	-3.218*** (.925)	1.300*** (.224)	-.011 (.180)
West	.686*** (.165)	.032 (.067)	.878*** (.169)	-.108 (.099)
Pr (AC)*Ln SIZE	-.225 (.168)	-.177 (.162)	-1.387*** (.160)	-.019 (.160)
BUYER_PLANT*Ln SIZE	.299*** (.052)	.026 (.030)	-.093** (.043)	-.098*** (.031)
Ln PROD*Ln SIZE	-.017 (.031)	-.038** (.017)	.136*** (.025)	.030 (.019)
Ln WAGE_SHARE*Ln E ₇₇	.069** (.031)	-.038** (.018)	.268*** (.030)	-.017 (.024)
MULTI*Ln SIZE	-.171*** (.043)	-.134*** (.029)	-.322*** (.049)	-.258*** (.033)
OUTSIDE ¹ *Ln SIZE	.102 (.065)	.139*** (.029)	.403*** (.067)	.126*** (.040)

See notes at end of table.

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Table 5

Probit regression of plant closures for dairy, 1977-82 and 1982-87—Continued

Dependent variable	1977-82		1982-87	
	Cheese	Fluid milk	Cheese	Fluid milk
NOT_FOOD*Ln SIZE	.734*** (.173)	.758*** (.175)	-.226*** (.055)	.059 (.039)
West*Ln SIZE	-.214*** (.047)	-.039** (.019)	-.152*** (.043)	-.030 (.024)
Log likelihood	-7,533	10,371	-4,476	-7,806
OBS	1,168	2,756	1,050	1,777

Numbers in parentheses = Standard errors.

n.a. = Not applicable.

*, **, and ***Significant at 90-, 95-, and 99-percent levels.

Notes: Dependent variable = Plant closure (1,0).

¹OUTSIDE = One for plants outside the industry in question (cheese or fluid milk) and zero otherwise.

Table 6

Probit regression of plant closures for grains and oilseeds, 1977-82 and 1982-87

Dependent variable	1977-82			1982-87		
	Flour milling	Feed	Oilseeds ¹	Flour milling	Feed	Oilseeds ¹
Intercept	-1.241*** (0.363)	-0.717*** (0.197)	-0.460 (0.332)	-0.751*** (0.293)	-0.988*** (0.175)	0.828** (0.407)
Pr (AC)	2.808*** (.444)	-3.394*** (.857)	-.298 (.590)	2.478*** (.619)	-2.537*** (.469)	-1.041* (.665)
BUYER_PLANT	-.192 (.137)	.399*** (.095)	.755*** (.160)	.791*** (.115)	.015 (.092)	.113 (.128)
Ln PROD	-.691*** (.115)	-.392*** (.076)	.288** (.117)	-.380*** (.084)	-.233*** (.056)	.170 (.109)
Ln SIZE	-.055 (.081)	.077 (.050)	-.116 (.074)	-.081 (.080)	.249*** (.056)	-.129 (.106)
Ln WAGE_SHARE	-.683*** (.141)	-.204*** (.025)	.232*** (.107)	-.102 (.095)	-.320*** (.056)	.437*** (.111)
AGE72	-.200*** (.034)	-.097*** (.029)	-.220*** (.052)	.128*** (.044)	-.144*** (.030)	-.008 (.048)
AGE77	n.a.	n.a.	n.a.	-.120** (.052)	-.149*** (.035)	.027 (.062)
MULTI	-.037 (.152)	-.505*** (.094)	.679*** (.215)	.564*** (.146)	.601*** (.121)	.294 (.211)
NOT_FOOD	-.214* (.127)	-4.987*** (.775)	.827*** (.182)	.404*** (.130)	.263** (.137)	.161 (.115)
OUTSIDE ²	.030 (.167)	.722*** (.125)	n.a.	.143 (.187)	.516*** (.133)	n.a.
Corn	n.a.	n.a.	2.167*** (.341)	n.a.	n.a.	1.667*** (.468)
Cotton	n.a.	n.a.	2.247*** (.315)	n.a.	n.a.	1.064*** (.412)
Soy	n.a.	n.a.	1.958*** (.401)	n.a.	n.a.	2.071*** (.322)
Pr (AC)*Ln SIZE	-.518*** (.128)	-.165 (.140)	.248** (.126)	-.314*** (.094)	.194** (.090)	.041 (.124)
BUYER_PLANT*Ln SIZE	-.009 (.032)	-.038 (.024)	-.119*** (.037)	-.167*** (.026)	.102*** (.022)	-.037 (.030)
Ln PROD*Ln SIZE	.153*** (.027)	.065*** (.019)	-.112*** (.029)	.082*** (.020)	-.233*** (.056)	-.073** (.023)
Ln WAGE_SHARE*Ln SIZE	.219*** (.032)	.195*** (.019)	.046* (.026)	.083*** (.023)	.157*** (.016)	.041 (.124)
MULTI*Ln SIZE	.066* (.037)	.092*** (.022)	-.065 (.052)	-.138*** (.037)	-.104*** (.029)	-.111** (.051)

See notes at end of table.

Continued—

Table 6

Probit regression of plant closures for grains and oilseeds, 1977-82 and 1982-87—Continued

Dependent variable	1977-82			1982-87		
	Flour milling	Feed	Oilseeds ¹	Flour milling	Feed	Oilseeds ¹
NOT_FOOD*Ln SIZE ₇₇	.107*** (.030)	n.a.	-.148*** (.041)	-.074** (.031)	.132*** (.032)	-.091*** (.024)
OUTSIDE*Ln SIZE	.048 (.044)	-.247*** (.041)	—	.026 (.051)	-.110*** (.034)	—
Corn*Ln SIZE	n.a.	n.a.	-.458*** (.086)	n.a.	n.a.	-.999*** (.244)
Cotton*Ln SIZE	n.a.	n.a.	-.432*** (.081)	n.a.	n.a.	-.310*** (.093)
Soy*Ln SIZE	n.a.	n.a.	-.560*** (.119)	n.a.	n.a.	-.581*** (.085)
Log likelihood	-5,815	-9,818	-2,649	-6,498	-8,117	-5,373
OBS	1,633	2,688	960	1,617	2,017	1,364

Numbers in parentheses = Standard errors.

n.a. = Not applicable.

*, **, and ***Significant at 90-, 95-, and 99-percent levels.

Note: Dependent variable: = Plant closure (1,0).

¹Oilseeds include soybean, wet corn, and cottonseed milling.

²OUTSIDE = One for plants outside the industry in question (flour or feed) and zero otherwise. Several dummy variables are used to control for different types of oilseeds.