The Impacts of Farm Animal Welfare Laws on Meat Supply and Consumer Perception of Value

Benjamin Blemings[*], Peilu Zhang[†], Clinton L. Neill[‡]

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PRELIMINARY DRAFT:

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Abstract

Farm animal welfare laws are a debated topic. They likely increase the cost of production, but consumers may also value the resulting meat for higher quality or for other reasons such as supporting corporate social responsibility or having preferences for animal well-being. This study asks how farm animal welfare laws impact meat production and the subsequent value that consumers place on meat produced under farm animal welfare laws. The observational analysis leverages the 8 states that have changed laws regarding gestating sow crates in a differences-in-differences framework. We then perform a consumer preference study using a double-bounded contingent valuation design with treatment effects to separate out the heterogeneous beliefs about animal welfare law effects. The results of the consumer study are then used to simulate counterfactual changes in the value, price, and gross income of the observational data. The results of the study can be used to better understand the theoretical and empirical effects of animal welfare regulation, and how marketing efforts that effectively change consumer perceptions may change the financial impacts of such policies.

Keywords: Farm Animal Welfare, Preference Experiment, Hog Production, Sow Crate

JEL Classification: Q18, Q11, D24

[*]Benjamin Blemings, Ph.D., Dyson School of Applied Economics and Management, Cornell University, Ithaca, New York 14850. E-mail: btb77@cornell.edu

[†]Peilu Zhang, Ph.D., Dyson School of Applied Economics and Management, Cornell University, Ithaca, NY 14850. Email: pz88@cornell.edu

[‡]Clinton L. Neill, Ph.D., Dyson School of Applied Economics and Management, Cornell University, Ithaca, NY 14850. Email: cln64@cornell.edu

1 Introduction

Due to the internet increasing the ease and availability of information, the general public is increasingly aware of poor animal rearing conditions associated with industrial farming. Despite this growth in information, there are few papers that estimate the costs and benefits of improving animal welfare (Carlier & Treich, 2020). Instead, much of the literature focuses on consumers' preferences and WTP for products under different animal-friendly practices used in the production process (Carlsson, Frykblom, & Lagerkvist, 2007; Liljenstolpe, 2008; Lusk, Nilsson, & Foster, 2007; Lusk, Norwood, & Pruitt, 2006; Tonsor, Olynk, & Wolf, 2009; Tonsor, Wolf, & Olynk, 2009; Viske, Lagerkvist, & Carlsson, 2006).

From these previous studies we cannot explicitly tell whether consumers care about animal welfare, care only about the quality of products under animal-welfare laws, or care about both (Carlier & Treich, 2020). Thus, there is a need to better value enhancements in animal welfare from both the social/public good view and the costs/benefits of production. We propose combining causal analysis of the effect of FAW laws on production with stated preference information to determine the change in market value from animal welfare changes. This combination of methodology allows for a robust understanding of how animal welfare is valued both under different regulatory scenarios and under different consumer motivations.

2 Observational Data and Methods

First, this paper estimates the relationship between a FAW law that dictates minimum sizes for gestating sow crates, which has been introduced in 8 states, and related market outcomes including: pounds sold, value, gross income, and production.[1] Data for state-level regulations on the size of gestating sow crates comes from the Animal Welfare Institute and data on yearly state-level

[1]The states that introduced the law, along with the year it was introduced, can be seen in Figure 1. Details about the relevant laws are shown in Table 1.

outcomes for hogs comes from USDA's NASS. The assembled data is a panel of 50 states from 1988-2020, with descriptive statistics being presented in Table 2.

The effects of the laws are estimated using static and dynamic two-way fixed effects (TWFE),

$$y_{st} = \beta_1 CrateLaw_{st} + \mu_s + \rho_t + e_{st}, \tag{1}$$

in which s stands for state and t stands for time. $CrateLaw$ is a binary variable that equals 1 if state s has passed the law in year t or before year t. The equation includes state and year fixed effects. The state fixed effects, μ_s, accounts for time-invariant state level factors. Importantly, total land area of states is time-invariant which limits the likelihood that acres farmed biases the estimated effects of the crate law. The year fixed effects, ρ_t, account for trends in hog meat production and value. The standard errors are clustered at the state-level to account for errors that are correlated within state and some forms of mis-specification.

Since staggered adoption of laws can bias estimates of the treatment effects if effects are heterogeneous, several new estimators which address this issue are also used. Furthermore, dynamic effects from an event-study design are also reported in which it is found that the data are consistent with parallel trends. No time-varying controls are included, but extensive attention is paid to the heterogeneous impacts of the laws across separate cohorts of treated states. Furthermore, the law has no statistically significant or economically meaningful effects on either total farms or total acres for farming.

3 Observational Results

The naïve TWFE results, shown in Table 3, return large coefficients which are of the expected sign, gestating sow crate laws reduce supply and increase the value of hogs. The expected signs are however not backed up by statistical significant at conventional levels. This is not very surprising,

since there are only a few states that introduce the law and the likely mis-measured survey data is at a yearly level which leads to a modest dataset in which it is difficult to achieve statistical significance.

One possible limitation of these estimates is that the treatment is staggered and therefore TWFE will place weights on different comparisons. These different comparisons can bias the estimated effect by placing too much weight on inappropriate comparisons such as comparing late treated to early treated units.[2] As shown in the Goodman-Bacon Decomposition in Figure 2, almost all of the weight in the regressions are put on favorable comparisons (triangle markers) which suggests a limited bias in the estimated effects for most outcomes. Furthermore, most of the estimated effects with substantial weight are near the estimated coefficient for TWFE. One notable exception is the weights on value; as shown in Figure 2d, the largest weighted comparisons have negative effect sizes, while the TWFE estimate is positive. This is indicative that there may be heterogeneity in the effect of the laws on value across treatment timing groups/cohorts.

Next, Table 4 applies various new estimators in order to see whether the results are different after accounting for staggered adoption of the law.[3] The effect of the law on supply outcomes retain the expected sign and the effect of the law, using imputation and Callaway and Sant'Anna (2021) methods, is statistically significant on pounds sold. In general, the coefficients are of a fairly similar magnitude and usually closer to being statistically significant at 10%. Again, the estimated effect of the law on value oscillates sign depending on the estimator, but is correctly signed for the imputation and Callaway and Sant'Anna (2021) methods.

There is very likely to be some heterogeneity across treatment cohorts and this is perhaps unsurprising as later adopters can observe early adopters and attempt to mitigate any negative impacts on supply. Figure 3 embraces the heterogeneous impacts across treatment cohorts by

[2]Note that this is not an issue in a 2 period setup or if there are no heterogeneous effects across time or groups (De Chaisemartin & d'Haultfoeuille, 2020; Roth, Sant'Anna, Bilinski, & Poe, 2022). The comparison that is most desirable is comparing states that are treated to those that are never treated.

[3]The stacking estimator here should be interpreted cautiously, since with the recommended interacted fixed effects there's too much multi-colinearity to estimate the regression.

estimating the effect of the gestating sows laws for each separate treatment cohort. As Figure 3 shows, there are negative impacts that are statistically significant at 10% for pounds sold and these are consistent across all cohorts. However, for gross income and production the laws have negative (and sometimes statistically insignificant) effects on production and gross income for all but the last treatment cohort of 2012. The effects of the law on value differ the most by cohort. The law increased value for the 2006 and 2012 and these are both statistically significant. However, 4 treatment cohorts had increased value and 2 had decreased value. An interesting note is the 2012 cohort reduced pounds sold, but increased production, gross income, and value.

Finally, attaching a causal interpretation to these estimates requires the parallel trends assumption. While this is not directly testable, the dynamic effects are estimated in Figures 4-7. Broadly speaking, nearly all of the pre-treatment coefficients are close to the 0 line and no obvious patterns exist. This suggests that the parallel trends assumption is met and it is reasonable to attach a causal interpretation to the estimates.

Pounds sold may not have individually statistically significant coefficients, but there is a clear downward pattern in the post-treatment coefficients. For production, there is a period where they decline, but after a while they become less negative which suggests that the harmful impacts of the law on production are somewhat, though not completely, mitigated after an adjustment period. The 2012 cohort follows this general pattern, but after a few years the readjustment upwards is large enough to become positive. Gross income is very similar. Finally, value also increases, but this increase is not clearly visible and takes time to materialize.

4 Experimental

Next, we elicit consumers' willingness to pay (WTP) for hog products under gestating sow laws. We take advantage of a design that allows us to separate and compare the WTP for animal welfare itself and the quality of products under gestation crate regulations. We believe the identification

of what motivates animal-welfare concerns is important for policy makers weighing the costs and benefits of related regulations. We use a double-bounded contingent valuation approach to estimate WTP. Specifically, the product of interest are pork chops, a common cut of pork, with 4 price point variations ($4.0, $4.5, $5.0, $5.5). In each two-stage choice question, subjects were first asked to select between pork chops produced under the Gestating Sow Law (GSL) and pork chops which are not produced under the GSL. The price of pork chops which are not produced under the GSL is always $4.50 per pond. If the subject chose the GSL pork chops in the first stage, the price of the GSL pork chops increases by $0.50 in the second stage; if the subject chose the non-GSL pork chops, the price of the GSL pork chops decreases by $0.5 in the second stage. In each choice question, we also presented an introduction of gestation crates and the GSL before subjects make selections.

We implemented a between-subject design to separate out the effects of consumer beliefs about the effects of the laws. Subjects were randomly assigned to one of the four groups. Each group only varies in the extra information provided in the choice question about the increase in the quality of products and the increase in animal welfare due to the law. In the Baseline group, there is no extra information about the quality of products or animal welfare. In the "Quality & Welfare" group, we present the information "Research has found that the such Gestation Crate Laws increase the quality of pork products, and increases the welfare of hogs/sows.". In the "Quality" and "Welfare" group, the information provided is only about the quality of products and the welfare, respectively. Table 5 shows the information summary of each treatment group. Figure 8 is a screenshot of the choice question in the first stage in the "Quality" group.

At the end of the experiment, we asked participants' about their beliefs on animal welfare, welfare laws, and other benefits and costs of gestating sow laws. Demographic information including the state of residence was also elicited at the beginning of the experiment. In total, 1039 observations were collected. The demographic characteristics are balanced across groups as shown in Table 6.

In order to compare the WTP of each group, a double-bounded model was used as a function of demographic characteristics and beliefs. We first show the estimation results of each treatment group separately in Table 7. Factor 1 and factor 2 are factor scores analyzed based on subjects' responses to a set of 11 belief questions using principle component analysis with varimax rotation (Boxall & Adamowicz, 2002; Tonsor, Wolf, & Olynk, 2009). The first factor was labeled "pork products quality and animal welfare". The second factor was referred to "benefits of gestation crates to consumers". The significant positive coefficient of Factor 1 for each group suggest that consumers perceiving the GSL with higher quality of products and higher animal welfare are WTP higher premium for pork chops produced under the GSL. Individuals who believe the gestation crates generate benefits to consumers such as the lower price are WTP lower premium for pork chops produced under the GSL, as indicated by the significant negative coefficient of Factor 2 for each group (except the "Quality & Welfare" group).

We compare the mean WTP in Table 7 between each two groups. We find that the WTP of the "Quality" group is significantly lower than the WTP of the "Quality & Welfare" group and the "Welfare" group ($p = 0.039$, $p = 0.028$). There are no significant differences in the mean WTP between the baseline and the other groups, nor between the "Quality & Welfare" group and the "Welfare" group.

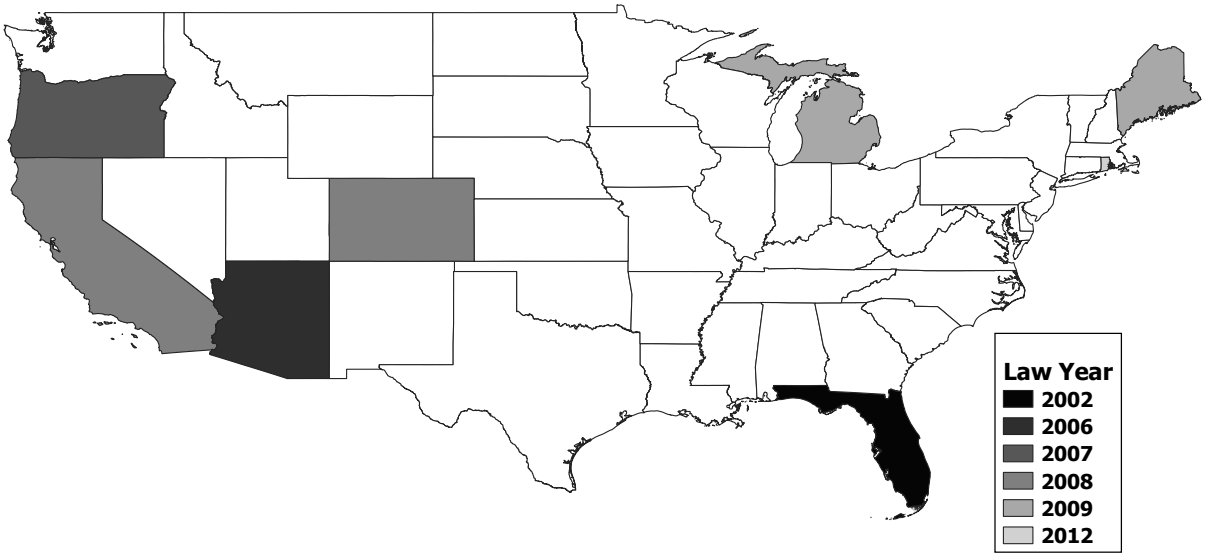
We further robustly compare the WTP of each group by setting treatment groups as independent variables in pooled models. Table 8 contains censored regression results of pooled models with and without controls. We treat the Baseline and the Quality group as the base group, respectively. In both results, the "Quality & Welfare" and the "Welfare" treatments significantly increase consumers' WTP. We do not find any significant effects of the "Quality" treatment on WTP compared to the baseline. In pooled models, the coefficients of "household income" and "household size" become significant due to the increase in power. The results of pooled model analysis are in line with our statistic comparisons of the mean WTP. We argue that the increase in the value of pork products produced under the GSL is mainly from consumers' considerations about the animal

welfare, instead of the quality of products. Our results provide marketing suggestions to business owners or policy makers when they choose labeling or marketing strategies for products produced under animal welfare related regulations. In next steps, we will address the separation of beliefs and preferences, which is a growing part of the WTP literature (Howard, Roe, Interis, & Martin, 2020; Lusk, Schroeder, & Tonsor, 2014; Neill & Williams, 2016; Roe, Interis, & Howard, 2018).

5 Conclusions/Implications

Analyzing the observational data in a causal framework allows for estimating both the costs (to production) and benefits (to value) of a prominent animal welfare law. The results from the consumer preference study then help us understand where the change in value is originating from in the causal inference analysis, and how a change in perceptions might change the value. This work has implications for the theoretical understanding of changes in value for animal welfare regulations based on consumer perceptions. Moreover, this work can inform other states' policymakers on the potential changes in value based on consumer perceptions before the implementation of such policies. The ramifications of such animal welfare laws will be better understood in terms of cost, benefits, and consumer perceptions of and reactions to such regulations.

Figure 1: Adoption of Laws Regarding Gestating Sow Crate Size



Note: Data comes from the Animal Welfare Institute. Year is the year the law was passed. Details of the laws can be seen in Table 1.

Table 1: Summary of Gestating Sow Crate Laws

State	Year	Format of Provision	Details
Arizona	2006	Ballot Measure (Prop 204, enacted as Ariz. Rev. Stat. Ann. § 13-2910.07)	Prohibits confining veal calves and gestating sows where they cannot lie down, fully extend limbs, or turn around freely for the majority (or all) of the day.
California	2008	Ballot Measure (Prop 2, enacted as Cal. Health and Safety Code, Ch. 13.8 § 25990)	Prohibits confining veal calves, gestating sows, and hens where they cannot lie down, fully extend limbs, or turn around freely.
Colorado	2008	Legislation (Colo. Rev. Stat. Ann. § 35-50.5-102)	Prohibits confining veal calves and gestating sows where they cannot stand up, lie down, or turn around freely.
Florida	2002	Ballot Measure (Amendment 10, codified in Fla. Const. Art. X, § 21)	Prohibits gestation crates that prevent a pig from turning around freely; also includes a general statement that inhumane treatment of animals is a concern of Florida citizens.
Maine	2009	Legislation (Me. Rev. Stat. tit. 7, § 4020)	Prohibits confining veal calves and gestating sows where they cannot stand up, lie down, fully extend limbs, or turn around freely for the majority (or all) of the day.
Michigan	2009	Legislation (Mich. Comp. Laws. Ann. § 287.746)	Prohibits cruel confinement of veal calves, gestating sows, and hens where they cannot stand up, lie down, fully extend limbs, or turn around freely for the majority (or all) of the day.
Oregon	2007	Legislation (Or. Rev. Stat. § 600.150)	Prohibits confinement of gestating sows for more than twelve hours in a way that does not allow them to lie down, fully extend limbs, and turn around freely.
Rhode Island	2012	Legislation (4 R.I. Gen. Laws Ann. §4-1.1-3)	Prohibits confining veal calves and gestating sows where they cannot stand up, lie down, fully extend limbs, or turn around freely.
Ohio	2025	Regulations (Ohio Admin. Code §901:12-5-03 [veal]; §901:12-8 [swine])	Requires veal calves to be housed in group pens by 10 weeks of age where they can stand without impediment, rest using normal postures, groom, eat, turn around, and lie down. Limits sow gestation crates after 2025 to post-weaning for a period of time that seeks to maximize embryonic welfare and allows for confirmation of pregnancy.

Table 2: Descriptive Statistics

Panel A: Aggregate

	Mean	Median	SD	Min	Max	Count
Pounds of Hog Sold (millions)	596.28	83.31	1486.31	0	15077.2	1634
Hog Gross Income, Real (Millions)	402.02	58.86	969.11	0	9941.1	1634
Hog Production, Real (Millions)	373.64	53.69	879.48	0	8658.5	1634
Value (Thousands)	822.88	458.50	1065.80	0	8892.0	1634
Gest. Sows Law Effective	0.06	0.00	0.25	0	1.0	1650

Panel B: State Level

	Mean	Median	SD	Min	Max	Count
Year State is Treated	2007.63	2008.00	2.88	2002	2012	8
Whether State is Ever Treated	0.16	0.00	0.37	0	1	50

Note: Value refers to home consumption, excluding inter-state trade, as defined by the USDA.

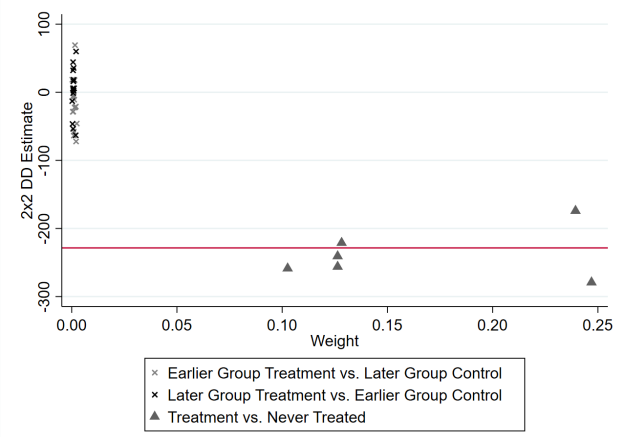
Table 3: Naive TWFE Estimates

Panel A: Pounds of Hog Sold	
	(1)
	Millions
Gestating Sows Law	-228.91
	(141.694)
	[0.09]
Observations	1634
Panel B: Gross Income	
	(1)
	Millions
Gestating Sows Law	-92.11
	(68.197)
	[0.17]
Observations	1634
Panel C: Production Dollars	
	(1)
	Millions
Gestating Sows Law	-72.27
	(56.628)
	[0.21]
Observations	1634
Panel D: Value	
	(1)
	Thousands
Gestating Sows Law	60.14
	(139.193)
	[0.67]
Observations	1634

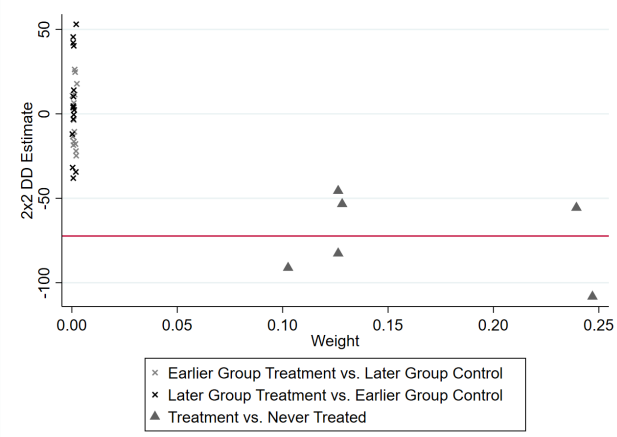
Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Cluster-robust standard errors, by state, in parentheses. Bootstrapped p-values in brackets. All regressions estimated by two-way fixed effects OLS. All regressions include state and year fixed effects. Gestating Sows Law is a binary variable equaling 1 if in a state that passes the law and the law has been passed.

Figure 2: Goodman-Bacon TWFE Diagnoses

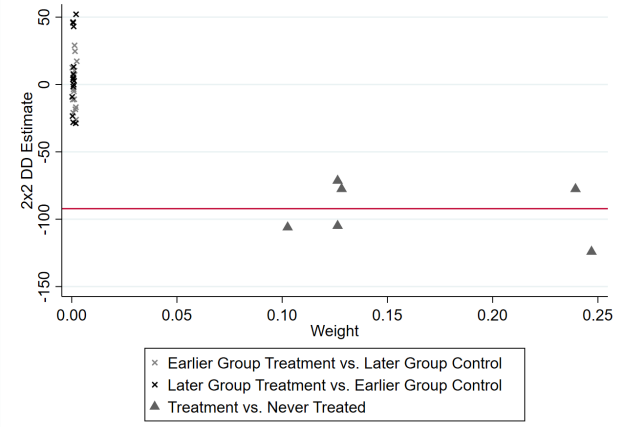
(a) Pounds Sold



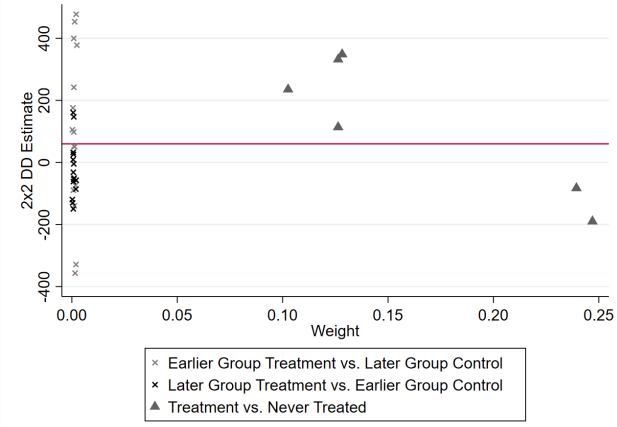
(b) Production



(c) Gross Income



(d) Value



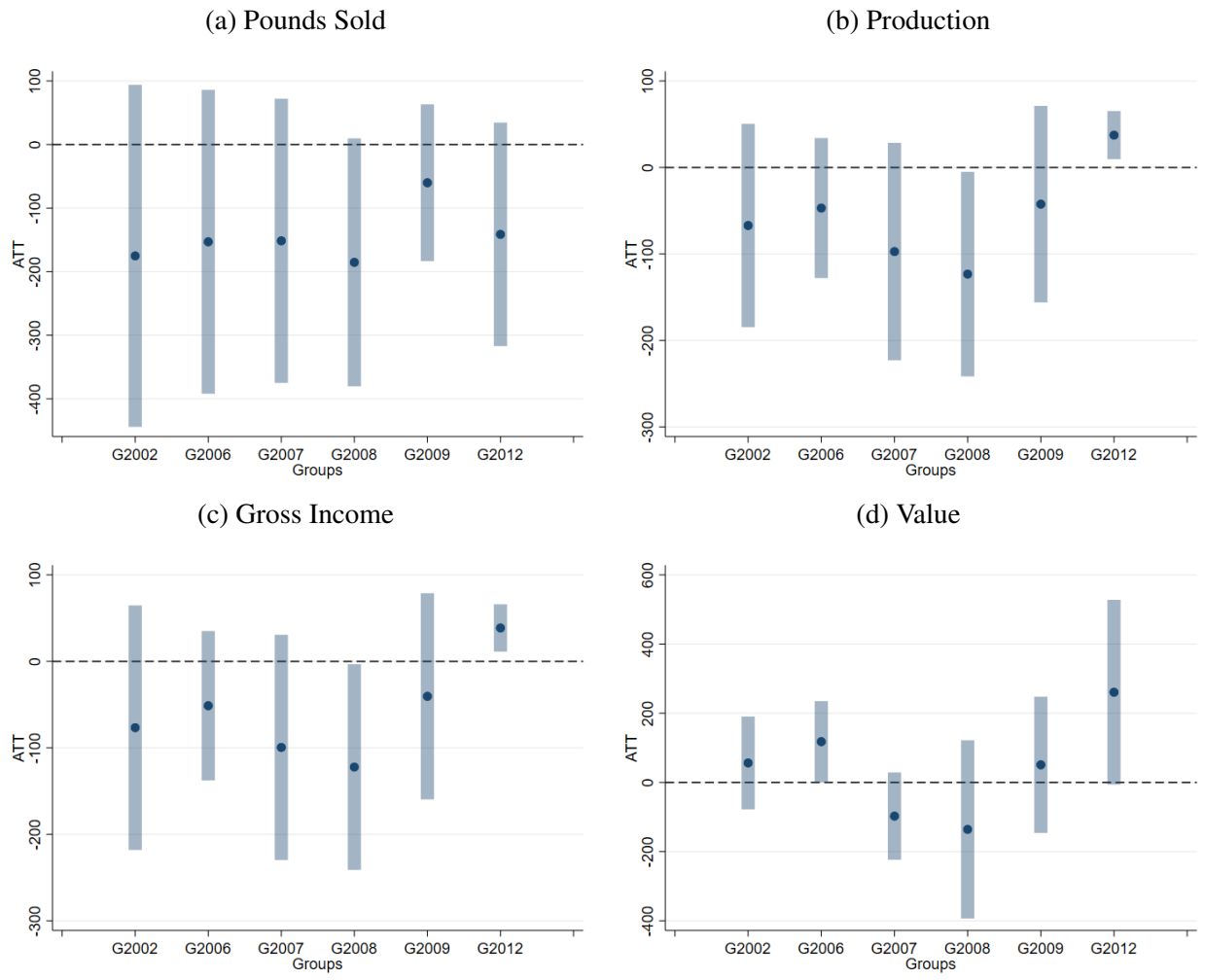
Note: Figures show Goodman-Bacon decompositions (Goodman-Bacon, 2021) of the TWFE estimates of the effect of gestating sow laws for pounds sold, production, gross income, and value.

Table 4: Alternative Estimators

Panel A: Pounds of Hog Sold			
	(1)	(2)	(3)
Gest. Sows Law Effective	-174.99	-232.89*	-142.75*
	(110.34)	(135.36)	(83.77)
Observations	5933	1634	1650
Stacked Method	X	-	-
Imputation Method	-	X	-
CS Method	-	-	X
Panel B: Gross Income			
	(1)	(2)	(3)
Gest. Sows Law Effective	-106.24	-93.36	-69.38
	(69.02)	(65.47)	(46.21)
Observations	5933	1634	1634
Stacked Method	X	-	-
Imputation Method	-	X	-
CS Method	-	-	X
Panel C: Production			
	(1)	(2)	(3)
Gest. Sows Law Effective	-88.12	-73.07	-67.58
	(58.75)	(54.38)	(43.81)
Observations	5933	1634	1634
Stacked Method	X	-	-
Imputation Method	-	X	-
CS Method	-	-	X
Panel D: Value			
	(1)	(2)	(3)
Gest. Sows Law Effective	-38.92	75.76	14.13
	(98.98)	(134.41)	(64.39)
Observations	5933	1634	1634
Stacked Method	X	-	-
Imputation Method	-	X	-
CS Method	-	-	X

Note: Column 1 uses TWFE on the stacked dataset which is balanced in event time in 4 periods before an acquisition and 5 periods after. It includes dataset by county and dataset by year fixed effects. Column 2 uses the imputation estimator of Borusyak, Jaravel, and Spiess (2021). Column 3 uses group-time effect aggregation from Callaway and Sant'Anna (2021). It uses never treated as comparison units, the doubly robust differences-in-differences estimator based on inverse probability of tilting and weighted least squares (Sant'Anna & Zhao, 2020), and shows the simple aggregation.

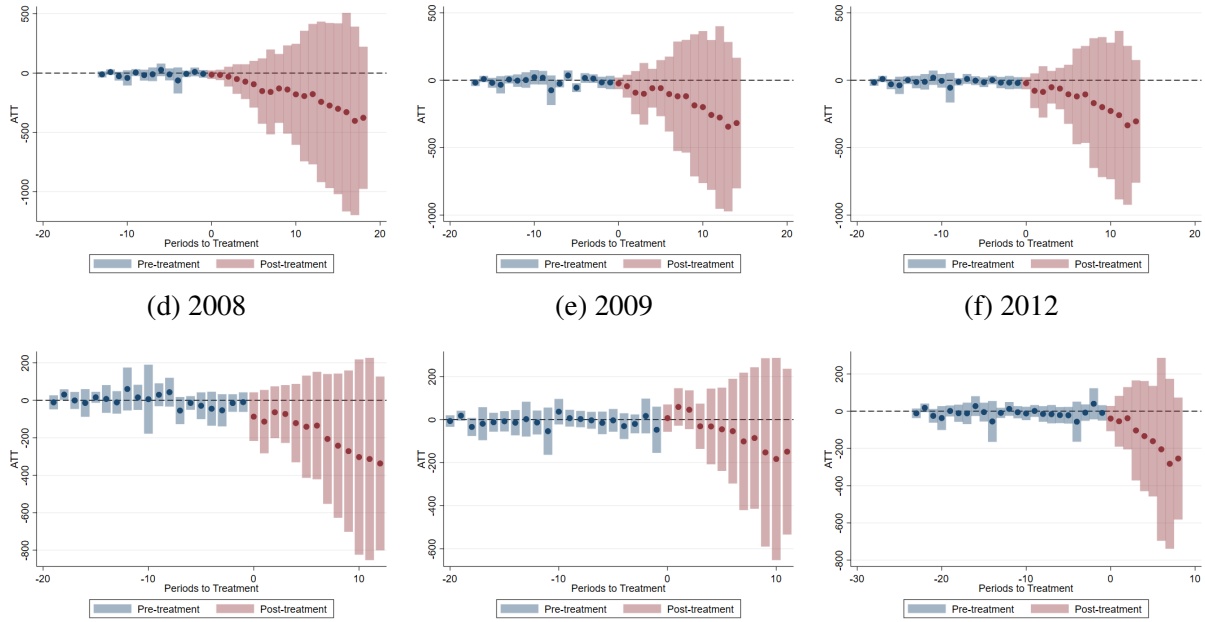
Figure 3: Group Level Estimates



Note: Estimates are group-level aggregates from Callaway and Sant'Anna (2021). Wild bootstrapped standard errors. 95% confidence intervals shown. Pounds sold, production, and gross income are in millions. Value is in thousands.

Figure 4: Event Studies by Group for Pounds Sold

(a) 2002 (b) 2006 (c) 2007

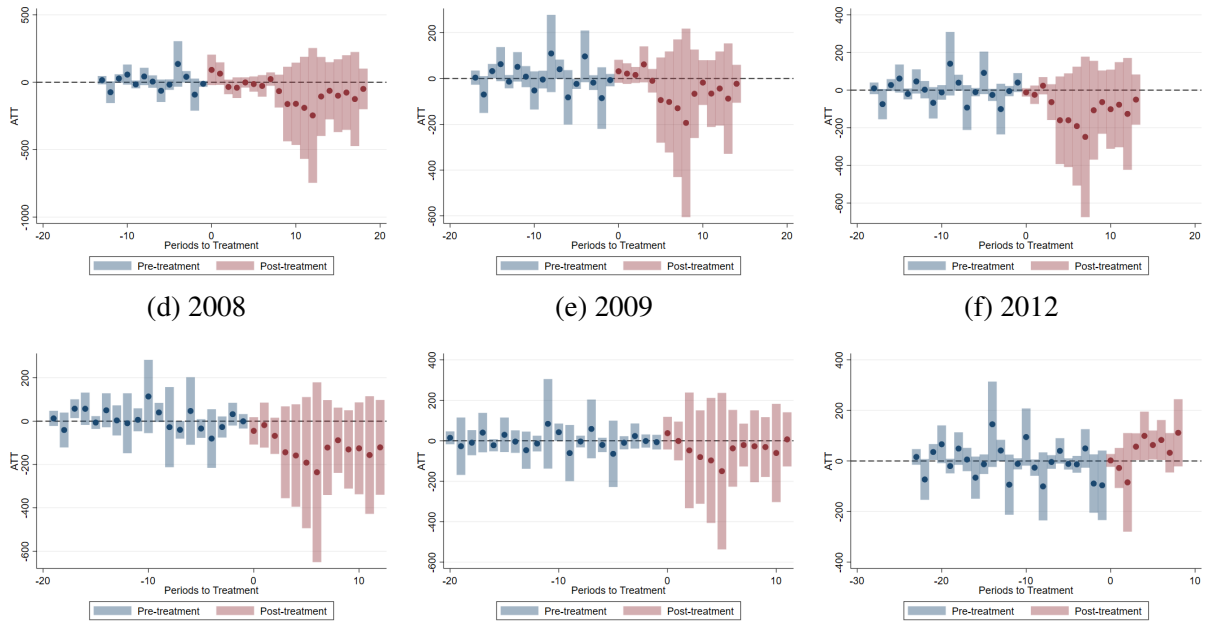


(d) 2008 (e) 2009 (f) 2012

Note: Presents event-study estimates from Callaway and Sant'Anna (2021). Wild bootstrapped standard errors.

Figure 5: Event Studies by Group for Production

(a) 2002 (b) 2006 (c) 2007

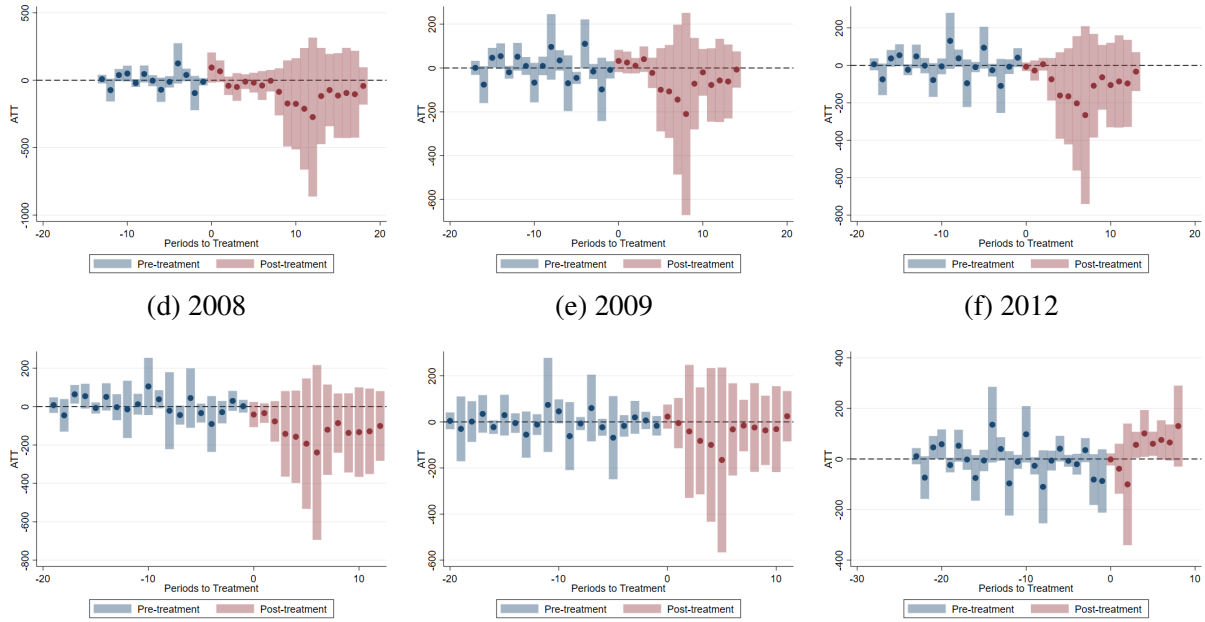


(d) 2008 (e) 2009 (f) 2012

Note: Presents event-study estimates from Callaway and Sant'Anna (2021). Wild bootstrapped standard errors.

Figure 6: Event Studies by Group for Gross Income

(a) 2002 (b) 2006 (c) 2007

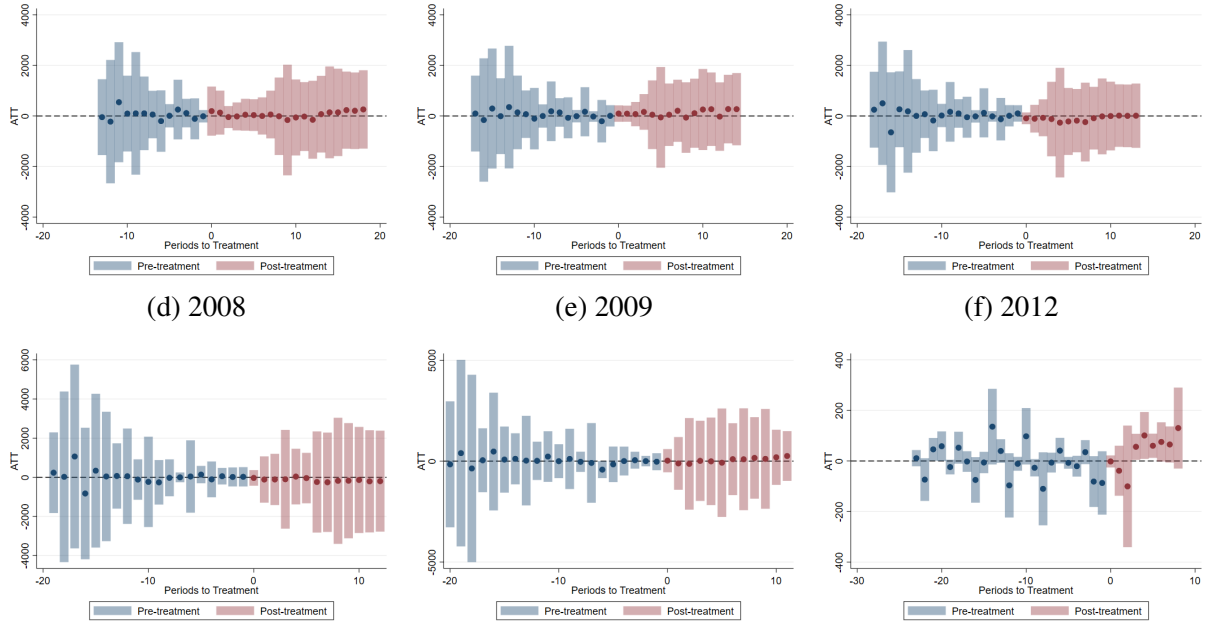


(d) 2008 (e) 2009 (f) 2012

Note: Presents event-study estimates from Callaway and Sant'Anna (2021). Wild bootstrapped standard errors.

Figure 7: Event Studies by Group for Value

(a) 2002 (b) 2006 (c) 2007



(d) 2008 (e) 2009 (f) 2012

Note: Presents event-study estimates from Callaway and Sant'Anna (2021). Wild bootstrapped standard errors.

Table 5: Summary of treatment groups.

	Introduction of gestation crates and the law	Extra information	No. Observation
Baseline	Yes	N/A	268
Quality & Welfare	Yes	"Research has found that the such Gestating Crate Laws increase the quality of pork products, and increases the welfare of hogs/sows."	258
Quality	Yes	"Research has found that the such Gestation Crate Laws increase the quality of pork products."	243
Welfare	Yes	"Research has found that the such Gestation Crate Laws increase the welfare of hogs/sows."	270

Figure 8: Screen Shot of Choice Question in the First Stage of "Quality" Group

Gestation crates (sometimes also called gestation stalls) refer to metal crates (approximately 7 feet long and 2 feet wide) that house female breeding stock (hogs/sows) in individually confined areas during an animal's four-month pregnancy. As of 2022, eight passed the laws against using gestation crates. Specifically, the law prohibits the use of crates in gestating hogs/sows so that they can stand up, lie down, or turn around freely.

Research has found that the such Gestation Crate Laws increase the quality of pork products.

Suppose the next time you go to the grocery store for purchasing pork chops you see the following two options. Which pork chop option would you choose to purchase?

Please answer as if you were actually making shopping decisions in the grocery stores.

Pork chops at $5.00 per pound. The pork is produced under the Gestating Sow Law (i.e., no use of gestation crates.)	Pork chops at $4.50 per pound. The pork is not produced under the Gestating Sow Law (i.e., use of gestation crates.)
○	○

Table 6: Summary of demographic characteristics.

	Baseline	Quality & Welfare	Quality	Welfare
Age (median)	43	41	43	42
Gender	51.9% (F) 48.1% (M)	50.8% (F) 49.2% (M)	51.0% (F) 49.0% (M)	52.2% (F) 47.8% (M)
Education(median)	2 year/Associates Degree	2 year/Associates Degree	2 year/Associates Degree	2 year/Associates Degree
Household Income(median)	$60,001-$65,000	$60,001-$65,000	$60,001-$65,000	$50,001-$55,000
Household Size(mean)	3	3	3	3
Pork products consumption (weekly)	2.5	2.5	2.5	2.4

Table 7: Censored regression results of each treatment group.

	Baseline	Quality & Welfare	Quality	Welfare
Constant	5.622^{***} (0.866)	7.425^{***} (0.868)	5.724^{***} (0.927)	6.312^{***} (0.999)
Age	-0.001(0.008)	-0.015^{**} (0.007)	-0.006 (0.008)	0.004 (0.008)
Male	0.309 (0.245)	-0.191 (0.234)	-0.256 (0.253)	0.113 (0.253)
Household Income	0.009 (0.018)	0.007 (0.016)	0.030^{*} (0.017)	0.018 (0.017)
Education	0.054 (0.120)	0.070 (0.109)	-0.061 (0.120)	-0.069 (0.118)
Children in the Household	0.094 (0.310)	-0.245 (0.279)	0.124 (0.319)	-0.140 (0.347)
Household Size	$-0.184^{*}(0.106)$	-0.208^{**} (0.097)	-0.006 (0.116)	-0.073 (0.126)
Weekly Pork Consumption	0.041 (0.112)	0.011 (0.117)	0.034 (0.127)	-0.024 (0.112)
Resident of the GSL state	0.029 (0.256)	-0.043 (0.231)	-0.239 (0.258)	-0.057 (0.267)
Factor 1	0.495^{***} (0.123)	0.517^{***} (0.101)	0.454^{***} (0.118)	0.615^{***} (0.123)
Factor 2	-0.312^{***} (0.119)	-0.161 (0.114)	-0.347^{***} (0.122)	-0.214^{*} (0.126)
Mean WTP	\$5.764 (0.131)	\$5.978 (0.141)	\$5.584 (0.126)	\$6.010 (0.144)
95% WTP Conf. Interval	[\$5.506, \$6.022]	[\$5.702, \$6.253]	[\$5.337, \$5.831]	[\$5.728, \$6.291]
Log-likelihood	-297.935	-243.681	-281.985	-282.627
No. Obervation	268	258	243	270

Notes: Factor 1: Pork products quality and animal welfare. Factor 2: Benefits of gestation crates to consumers. Standard errors are presented in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$.

Table 8: Censored regression results of pooled models.

	vs Baseline	vs Baseline	vs Quality group	vs Quality group
Q&W group	0.295^{*} (0.158)	0.376^{**} (0.154)	0.444^{***} (0.161)	0.454^{***} (0.156)
Welfare group	0.241 (0.154)	0.282^{*} (0.150)	0.390^{**} (0.157)	0.360^{**} (0.153)
Quality group	-0.149 (0.155)	-0.078 (0.150)		
Baseline			0.149 (0.155)	0.078 (0.150)
Constant	5.705^{***} (1.114)	6.153^{***} (0.462)	5.556^{***} (1.116)	6.075^{***} (0.464)
Age		-0.005 (0.004)		-0.005 (0.004)
Male		-0.004 (0.123)		-0.004 (0.123)
Household Income		0.017^{**} (0.008)		0.017^{**} (0.008)
Education		-0.003 (0.058)		-0.003 (0.058)
Children in the Household		-0.058 (0.155)		-0.058 (0.155)
Household Size		-0.117^{**} (0.055)		-0.117^{**} (0.055)
Weekly Pork Consumption		0.016 (0.057)		0.016 (0.057)
Resident of the GSL state		-0.099 (0.126)		-0.099 (0.126)
Factor1		0.514^{***} (0.058)		0.514^{***} (0.058)
Factor2		-0.276^{***} (0.060)		-0.276^{***} (0.060)
Mean WTP	\$5.806 (0.068)	\$5.843 (0.068)	\$5.806 (0.068)	\$5.843 (0.068)
95% WTP Conf. Interval	[\$5.672, \$5.939]	[\$5.710, \$5.977]	[\$5.672, \$5.939]	[\$5.710, \$5.977]
Controls	No	Yes	No	Yes
Log-likelihood	-1177.065	-1116.243	-1177.065	-1116.243
No. Obervation	1039	1039	1039	1039

Notes: Standard errors are presented in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$.

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