TO BE OR NOT TO BE PREMIUM PRICING OF SWINE FACILITY FARM SALES IN A *DE FACTO* MORATORIUM ENVIRONMENT: THE CASE OF NORTH CAROLINA

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Abstract

There exists a de facto moratorium on the expansion of swine farms in North Carolina stemming from 1997 legislation due predominantly to the waste management issue from these types of farms. Swine farm operators are required to maintain a manure land application permit which specifies a maximum allowable steady state live weight (SSLW) at each site. New or expanded swine production capacity is effectively prohibited. The only option available for farm expansion is to purchase an existing swine farm with a valid SSLW permit and operate as it is or convert the farm type within the SSLW permit constraints. This leads to questions of how to value the permit or if a premium for swine farm purchase has developed since the beginning of the moratorium. Farm sales data from 130 swine farms in Southeastern North Carolina are evaluated in an attempt to answer this question. Initial results seem to indicate that a premium is applied to swine farm sales over the time period under study. Analysis provides insights into divergent characteristics of subsets within the sample. Preliminary regression analysis yields strong correlations of premiums with swine production capacity, land area, and other characteristic of farms sold. Planned data acquisition and additional analysis are described.

Key words: moratorium, regression, steady-state live weight, premium, farm sales

Sub theme: Business and Finance

Introduction

This paper introduces a data set which is used to address the question; "Because North Carolina has a *de facto* moratorium on swine industry expansion, at the state level as well as at individual farm locations, do swine farms that sell in North Carolina exhibit a premium charge incorporated into the final sales price?" Agricultural lenders and their clients (producers who finance plant and operations) are interested in the fair-market-value (FMV) of agricultural property. Professionals: appraisers/valuers, consultants, accountants and lawyers, all have an interest in knowing what the FMV of a property is in order to provide the best possible advice relative to major capital purchases in which their clients may engage. Land, buildings and equipment on an improved property constitute an example of such a purchase in a capital intensive business such as swine production. In a business environment where industry expansion is forbidden via legislation or rules that maintain the *status quo* at the state or regional level, a firm may only expand by buying a farm with an operational permit at a specified level of production. Does a sale of a swine farm in this case exhibit a premium being generated upon the individual farm unit sales? Individual farm sales data from one of North Carolina's Farm Credit Associations were obtained to determine if this question could be answered. The question of how and by which farm components a premium may be generated is key to providing useful information to business advisers. Is the premium a systematic outcome of the appraisal/valuation process? How might swine farm sales in a restricted market such as North Carolina compare to those without restriction? The data and analysis reported in this

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paper identify components of sales. Tests are conducted for correlation of the specified premium with the farm components and other descriptive variables.

Historical Context and Present Situation

The current severe constraints on expansion of swine production capacity in North Carolina arose from a period of extraordinary growth. The inventory of pigs in North Carolina rose from 2.57 million head in December, 1989 to 5.4 million in 1993 and 9.7 million head in December, 1998 (NC Ag. Statistics). During the 1995 – 1997 period, swine had surpassed broilers as the leading source of cash receipts from farming in North Carolina; exceeding $2 billion in 1997. Smithfield Foods opened the first 1,000 head per hour slaughter line of a new pork packing plant at Tar Heel, NC in 1992. It eventually operated at design capacity of 32,000 pigs per day. The addition of 7 million pigs (11% of US inventory) and corresponding new swine barns and manure management capacity in a few counties in eastern North Carolina created economic, social and political upheaval locally, state-wide, nationally, and internationally. North Carolina manure management regulations and swine farm siting rules were revised in 1992 to address the new large facilities. The political furor grew with the continued proliferation of large swine farms in North Carolina, Missouri, Texas and Oklahoma, and Utah. The US Environmental Protection Agency was sued in 1993 to force revision of rules regulating large livestock farms. The political battle grew in North Carolina as state laws regulating swine farms were revised regularly between 1992 and 1998. The Raleigh, North Carolina News and Observer published a five part series that raised questions about the new swine industry and eventually won a Pulitzer Prize (Boss Hog, 1995). Later in 1995, a ruptured swine manure anaerobic treatment lagoon spilled millions of gallons across fields and into the New River. Large numbers of fish also died in the lower Neuse River that same year. In September, 1997 the state government adopted a 'moratorium' on new and expanded swine farms. After several extensions of the 'moratorium', the provisions were made permanent in 2009. New and expanded facilities could and can be built as long as they meet five stringent criteria for protection of the environment, public health, and nuisance minimization. One manure treatment system has met those criteria but remains too expensive for wide spread commercial adoption (e.g. NC Animal and Poultry Waste Management Center). As a result, the supply of swine production buildings has remained fixed in North Carolina since the end of 1997. North Carolina marketed 19.5 million pigs in 2008 with 12.2 million slaughtered in North Carolina and several million more slaughtered in neighbouring Virginia. A few million weaned pigs and feeder pigs are shipped to the Midwestern US to be fed and slaughtered. A general perception is that hog finishing capacity is limiting in NC and that weaned pig production has been economically competitive with production in the Midwest.

A number of large pig farms have been built in North Carolina since 1988. Pig finishing farms are the most numerous and typically include two or more buildings that each house between 800 and 1200 pigs (23 to 128 kilograms). Pig nursery farms were an innovation adopted during the 1990s and are typically one or two buildings that each house about 2,600 nursery pigs (5.5 to 23 kilograms). The sow farms or farrow to wean farms include multiples of modules of buildings that house 1,000 sows and nursing pigs. Virtually all of the large pig farms in North Carolina use recycled liquid to flush manure from shallow pits or gutters beneath slatted floors into anaerobic treatment and storage lagoons. The permitting system adopted in North Carolina requires each farm with more than 250 pigs to have someone acquire a permit for land application of manure or anaerobic lagoon effluent. The permits specify the maximum number of Steady State Live Weight (SSLW) that may be maintained at each farm. SSLW is a statutory indicator of the average weight of pigs present at a farm over a year. The SSLW rule assigns weights to each type of pig: for example, 197 kg (433 pounds) per sow capacity at a farrow to wean facility, 13.6 kg (30 pounds) per pig capacity at a nursery facility, and 61.4 kg (135 pounds) per pig capacity at a finishing facility. The 'moratorium' requires that any renovation of a permitted farm must not result in a new pig capacity that exceeds the permitted SSLW and that the renovations generally maintain the original 'footprint' of the pig buildings at that site.

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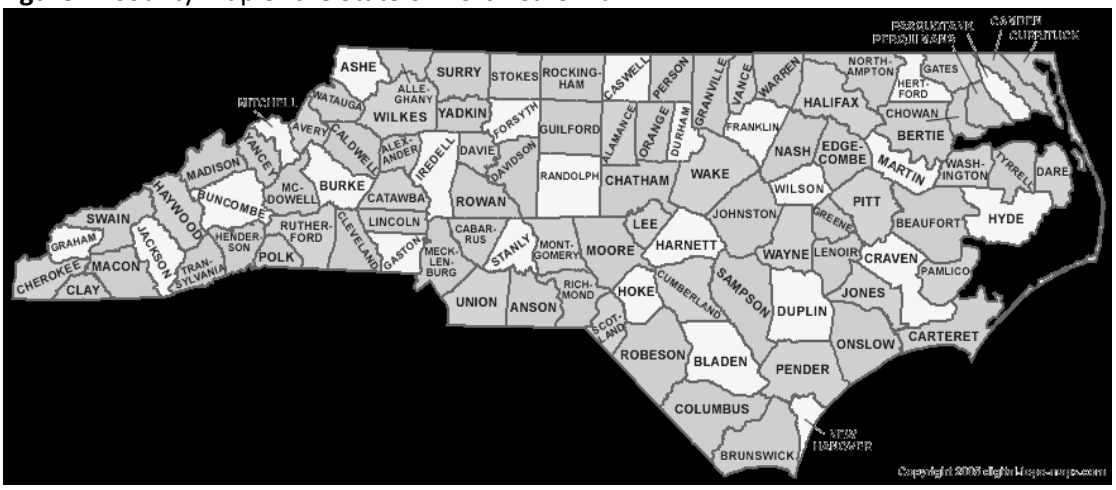
Data Description and Graphical Presentation

Raw sales data were obtained for 130 farms sales transactions from the Cape Fear Farm Credit Association of North Carolina (CFFC). The three Farm Credit Associations in North Carolina (Carolina Farm Credit, AgCarolina Financial, and Cape Fear Farm Credit) service over 50 percent of the agricultural loan portfolio in the state.[39] The three associations have unique geographical territories within North Carolina. Cape Fear Farm Credit Association services 12 counties in the south eastern part of the state with the main office in Fayetteville. Counties served are: Bladen, Brunswick, Columbus, Cumberland, Duplin, Harnett, Hoke, New Hanover, Pender, Robeson, Sampson, and Scotland. The majority of the farm sales under investigation are found in Bladen, Duplin, Pender and Sampson counties. The geographical area is shown in Figure 1. The data for the 130 farm sales spans a time period from 1997 to 2010. The raw data came from the Uniform Agricultural Appraisal Report (UAAR®) for each transaction. (AgWare, Inc. 2010) UAAR® is a proprietary computer software program used by CFFC to prepare appraisal (valuation) reports on sales of property being purchased by CFFC clients which CFFC is funding through a mortgage. The CFFC appraisal service is also used by individuals who seek to purchase farms with other lenders providing financing, some of these sales are also in the data set. The UAAR® consists of several parts: Sale Analysis, Land Mix Analysis, Income Analysis, Improvement Analysis, and Comments.

Figure 1. County map of the State of North Carolina.



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Sale Analysis provided data details on farm type (e.g. farrow to wean), grantor and grantee, how many deeded acres, sales date, county of sale, sales price, other contribution, net sales price, $US per deeded acre, type of swine unit, effective unit size, and other descriptive details.

Land Mix Analysis provided an analysis of the land base: how many arable acres, forested acres, other use acres such as the building footprint or site. This analysis provides a FMV for the land asset by use type.

Income Analysis provided a means for the appraiser/valuer to project income from the unit under consideration. This analysis is calculated using actual income (based on an existing contract) or estimated. In an integrated swine productions system, generally income is derived by the producer on a Stabilized $US per unit basis. The numbers of units then are multiplied by the Stabilized price and Stabilized yield to determine the Owner's share of income. For example, if 10,000 feeder pigs per year are delivered from a nursery and the basis for payment is the number of heads (rather than

[39] Per personal conversation with Mr. Gene Charville, President of AgCarolina Farm Credit following presentation to Agri-Business/NAMA Club at North Carolina State University, October 2009.

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pounds) and the contractual price is $3.50 per head, then 10,000 units with a yield of 1 head per year are multiplied by a stabilized price of $3.50 to obtain $35,000 in annual income.

Improvement Analysis provided a means for the appraiser to evaluate the various buildings and equipment of the swine unit. The appraiser/valuer made valuations based on his or her experience relative to the condition and age of the improvements. The baseline for these valuations was Replacement Cost New (RCN) less percent physical depreciation. RCN is verified by farm credit appraisers/valuers periodically with vendors who sell and build facilities and equipment to the swine industry; HOGSLAT, Inc. is an example of such a vendor. The net result was a contribution value of the improvements to the total sales price as a whole as well as a "per unit" value based the number of animal units for which the farm was permitted to have.

The Comments Section was used by the appraiser to make further comments or justification of the values derived in the above mentioned analysis sections. Often a reference was observed where the appraiser referred to the "moratorium" and provided a justification of a "premium" value calculated after the valuation analysis proved to be below the agreed upon sales price. Regulatory agencies, when reviewing appraisals, question such comments, thus providing concern to the underwriters of loans and ultimately to both the creditor and borrower. Premiums seemed, in the raw data, to be residuals that were assigned to the pig production capacity (in unit terms) of the farm, i.e. farrow-to-wean units or nursery or finishing units.

Model Specification and Statistical Methods

Total farm sales prices are separated into several basic components including pig buildings and equipment, land, other fixed capital improvements and land improvements, other more liquid assets such as timber and tractors, and the premium reported by appraisers. The sample is divided into five distinct farm types: farrow to wean, tunnel vented nurseries, naturally vented nurseries, totally slatted finishing, and partially slatted finishing. The data are analyzed in nominal terms and are analyzed in inflation adjusted terms based on use of a producer price index. The variables are described in terms of averages, standard deviations, and trends over the period. Comparisons are made across the five farm types to identify any differences in composition of the sale prices of the farms sold. A model is specified to test for correlations between the nominal premiums reported and characteristics of the farms. Explanatory variables included are county (dummy variables), year, pig production capacity of the farm in each of the five farm type categories, land area of the farm, and a PPI index representing swine farm profitability through time. Standard linear OLS regression analysis is conducted.

Preliminary Results

The individual farm sales data were entered into an EXCEL® spreadsheet. The result for the 130 farms is a data set that is 130 rows by 93 columns with a row representing the unique values from an individual farm sale. Because farmers and operators of livestock farms typically think in "per animal or unit" terms (e.g. Hargreaves and McCarthy 2010) the data were converted from total farm sale values to "value per unit" and "value per SSLW pound". Further the financial data were evaluated on a nominal US dollar basis and also converted to constant 2010 US dollars using the PPI month of June swine indices for 1997 through 2010. This PPI index can be found at www.bls.gov/ppi/ppi dr.htm, the US Bureau of Labour Statistics. Scatter plot diagrams were constructed for each of the five swine farm types under investigation: 25 farrow-to-wean, 26 natural vented nursery, 16 tunnel vented nursery, 40 full slat finishing, and finally 23 partial slat finishing farms. These scatter plots illustrate the data, in financial terms, per farm, per unit and per SSLW pound.

The scatter plots provide a visual representation of the variability over time for each of the farm types and early indications of where demand for specific farm types may be indicated. The scatter

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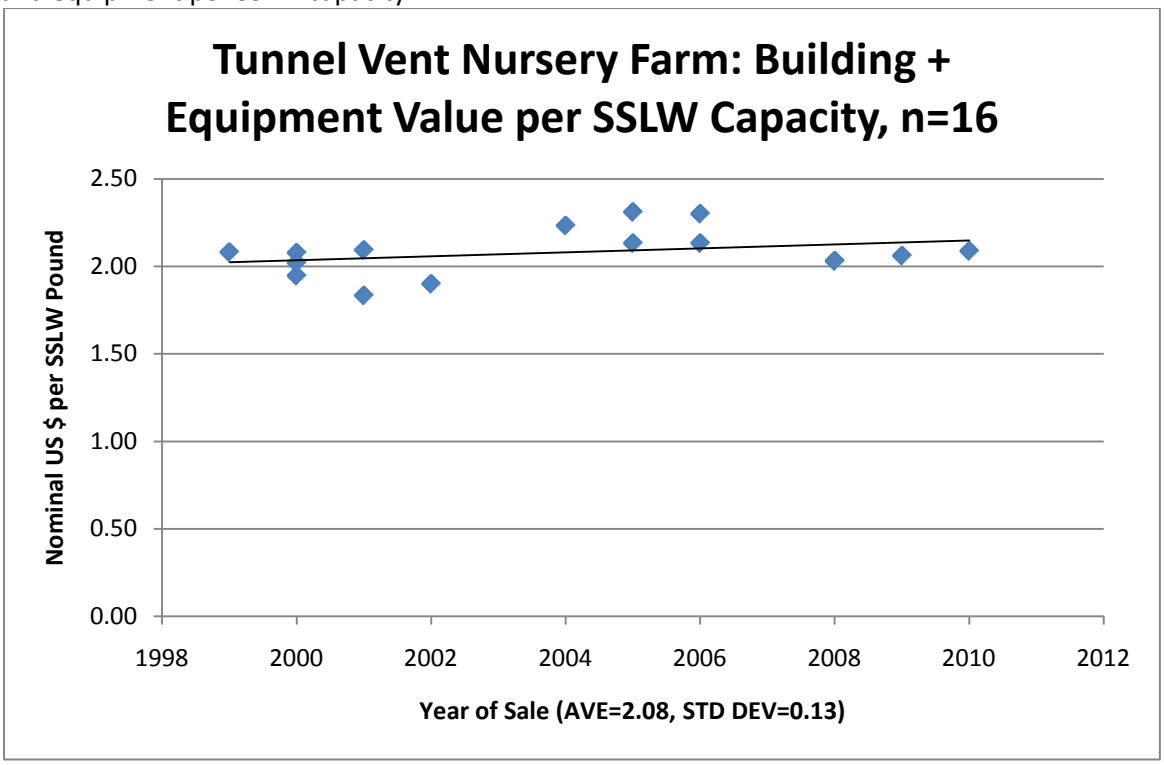
plots diagrams on a per unit or per SSLW pound provide additional insight to questions relative to these sales. By converting the values to constant 2010 US dollars, signs and slopes of linear trend lines were changed. Therefore, in real terms, increasing demand may be indicated by an increasing premium for a specific farm type and may be illustrated by positively sloped real premiums through time on the scatter diagrams. Conversely a negatively sloped trend line may indicate lower demand and lower premium. Results varied depending upon the focus of the scatter plot.

When viewed in nominal US dollars, the total farm sale was positively sloped for all farm types. However, when viewed in 2010 constant US dollars, the slope for naturally vented nursery farms became negative.

Evaluating the data on values allocated to buildings and equipment on a per unit basis in nominal US dollars every farm type, except partially slatted farms, demonstrated a positive slope over time. When the data observations were converted to 2010 constant US dollars, the slopes of every farm type, except full slatted finishing farms, was negative. This finding indicates, potentially, stronger demand may exist for the full slat finishing farms and/or that the rate of physical depreciation varies across farm types.

Identical outcomes were observed when the buildings and equipment portion of the sales data were converted to a SSLW pound basis. Figures 2 and 3, below, illustrate scatter plot results for tunnel vented nursery farms evaluated on a SSLW capacity (pound) criterion.

Figure 2. Scatter plot of Tunnel Vent Nursery farms illustrating nominal US dollar results for building and equipment per SSLW capacity.



When the reported premium was evaluated, different results were observed. For both the nominal and the PPI adjusted 2010 US dollars data, constructed scatter plots showed positive slopes for all farm types except the partial slatted finishing farms. The partial slatted farms produced negative slopes in both cases.

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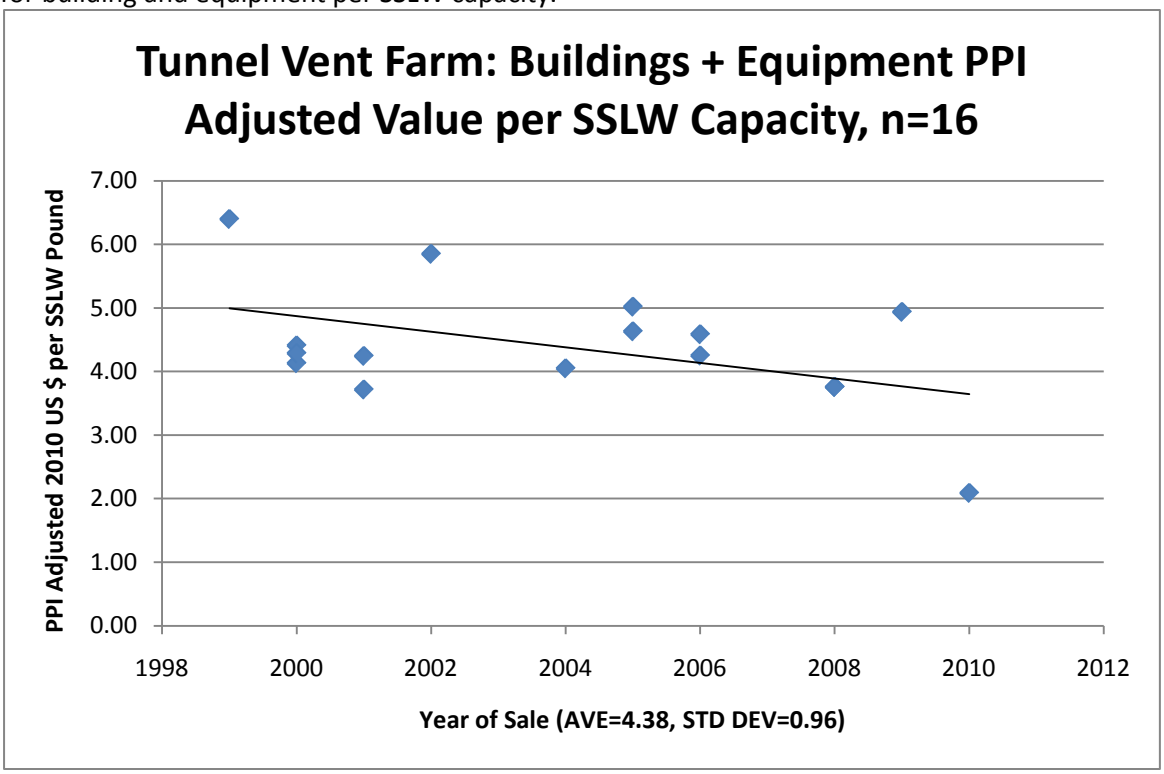
Using SSLW capacity (pounds) to make evaluations as the "least common denominator" has merit when comparing across farm types. SSLW capacity is a measure of waste that is produced by an animal reqardless of type. Arguably, therefore, SSLW capacity, though not a perfect equaliser, is closer to approximating a common value across farm types. Farmers and their advisors must use caution when comparing units of livestock across farm types, because a sow unit is not equal to a nusery pig unit. Sows, in the SSLW calculation are assigned the SSLW weight of 197 kg (433 pounds) per animal. The nursery pig is assigned 13.6 kg (30 pounds) for SSLW calculation purposes. Therefore, one sow unit is equal to 14.4 nursery pig units, whereas one SSLW capacity (pound) is equal to one SSLW capacity (pound) regardless of the animal source. Finally the assigned SSLW weight of finishing hogs is 61 kg (135 pounds).

Figure 3. Scatter plot of Tunnel Vent Nursery farms illustrating PPI adjusted 2010 US dollar results for building and equipment per SSLW capacity.



Summary statistics in nominal and constant dollars provided interesting results that farm advisors might find useful when working with their clients. Table 1 provides summary statistics for the data set in nominal US dollars. Table 2 provides summary statistics for the data set in constant 2010 US dollars.

Operators and managers of swine farms in North Carolina may be interested in comparative measures of evaluation across farm types, especially when considering an investment to expand a firm's scale. The only way to do that in North Carolina presently is to purchase an existing farm with an SSLW operations permit.

First, reviewing Tables 1 and 2, it is observed that the ratio of Standard Deviation to the Mean is much smaller for Buildings and Equipment than for total sales. This suggests that the valuation of Buildings and Equipment is relatively consistent across the sample; particularly on a per unit or SSLW pound basis. Further, values of buildings and equipment for some types of facilities such as nurseries are less variable than other types; perhaps reflecting less variation in capacity and age.

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Table 1. Summary Statistics in Nominal US Dollars for Each Farm Type: per farm, per unit and per SSLW lb for Farm Sales 1997 – 2010.

	Nominal US Dollars					
	Per farm		Per unit		Per SSLW lb	
Farm type	Average	STD DEV	Average	STD DEV	Average	STD DEV
TOTAL FARM SALE						
Farrow - Wean	2,320,155	1,383,210	912	218	2.17	0.36
Natural Vent Nursery	527,752	358,759	123	36	4.11	1.20
Tunnel Vent Nursery	743,267	417,683	128	36	4.28	1.21
Full Slat Finishing	1,033,727	752,333	184	43	1.36	0.32
Partial Slat Finishing	765,391	467,772	163	33	1.21	0.24
BUILDINGS AND EQUIPMENT						
Farrow - Wean	1,356,488	835,312	521	143	1.24	0.26
Natural Vent Nursery	243,544	138,179	56	8	1.88	0.28
Tunnel Vent Nursery	362,659	151,595	62	4	2.08	0.13
Full Slat Finishing	554,348	401,178	95	16	0.70	0.12
Partial Slat Finishing	351,812	237,607	70	14	0.52	0.10
REPORTED PREMIUM						
Farrow - Wean	509,232	430,132	184	96	0.44	0.21
Natural Vent Nursery	122,869	144,043	26	14	0.87	0.46
Tunnel Vent Nursery	130,265	89,240	24	18	0.80	0.59
Full Slat Finishing	111,775	116,452	18	14	0.13	0.10
Partial Slat Finishing	98,215	106,845	19	13	0.14	0.10

Second, the mean value of Building and Equipment as a share of mean value of total sale varies with farm type: nurseries are less than half, farrow to wean greater than half and finishing farms near half. This is consistent with the fact that the construction
costs of typically sized farms are less for nursery farms than other types. This observation provides some measure or direction as to where a premium, if any, may be assigned.

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Table 2. Summary Statistics in 2010 PPI Adjusted US Dollars for Each Farm Type: per farm, per unit and per SSLW lb for Farm Sales 1997 – 2010.

	2010 PPI Adjusted US Dollars					
	Per farm		Per unit		Per SSLW lb	
Farm type	Average	STD DEV	Average	STD DEV	Average	STD DEV
TOTAL FARM SALE						
Farrow - wean	4,974,653	3,191,280	1,940	656	4.62	1.32
Natural Vent Nursery	1,183,753	796,385	275	76	9.17	2.55
Tunnel Vent Nursery	1,547,152	831,151	268	81	8.92	2.71
Full Slat Finishing	2,259,669	1,771,769	395	105	2.92	0.78
Partial Slat Finishing	1,605,170	1,031,944	338	67	2.51	0.50
BUILDINGS AND EQUIPMENT						
Farrow - wean	2,918,380	1,919,152	1,113	424	2.69	0.88
Natural Vent Nursery	554,912	330,652	128	30	4.26	1.00
Tunnel Vent Nursery	764,670	338,229	131	29	4.38	0.96
Full Slat Finishing	1,213,095	938,325	205	45	1.52	0.34
Partial Slat Finishing	738,872	524,444	146	28	1.08	0.21
REPORTED PREMIUM						
Farrow - wean	1,100,011	996,157	392	232	0.93	0.51
Natural Vent Nursery	268,512	309,593	57	28	1.89	0.93
Tunnel Vent Nursery	272,795	197,070	49	36	1.65	1.21
Full Slat Finishing	240,542	254,169	37	29	0.27	0.21
Partial Slat Finishing	207,255	239,517	39	27	0.29	0.20

Third, the premium as a proportion of the value of buildings and equipment varies greatly by type of facility. The premium averaged 18 to 27 % of buildings and equipment value for finishing floors, about 35% for farrowing facilities, and 38 to 46 % for nurseries. Relative variation in premiums was largest for the finishing floors and least for the farrowing facilities. Several hypotheses are raised by these summary statistics. First, demand seems to be constant or increasing for these facilities. Second, different premium to value of buildings and equipment ratios suggest that the premium is based on something other than capital value of buildings and equipment alone. Possibilities include the land area parcelled with the facility and the income generating capacity of the facility.

Regression analysis of 130 observations generated strong statistical results for the model specified above. Initial regressions of several combinations of the variables with and without an intercept term indicated that the county dummy variables were not close to statistically significant. Therefore, farm location does not strongly affect the premium assigned. The county dummies were dropped and the last form of the equation estimated is reported here with estimated coefficients and with p values in parentheses. On the other hand there is a strong and positive correlation between all capacities levels (i.e., sows, feeder pigs and finishing hogs) and the premium assigned, as it was expected. Regarding the impact of acres on premium, we would expect an inverse relationship, due to the fact that larger farms have lower yield risk than smaller farms. The least squares estimation verified our initial assumptions. The negative coefficient of land acreage is consistent with empirical and theoretical studies, which suggest that premiums are usually substantially higher for small acreage than for larger acreage (Schurle, 1996). The R^2 is 0.746, the adjusted R^2 is 0.729, and F statistic at 44 is highly significant.

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Estimated equation: Nominal Premium ($/farm) = -3.79e+07 (0.000) + 18942 (0.000) x Year of Sale + 226.5 (0.000) x Farrowing Capacity + 33.97 (0.000) x Tunnel Ventilated Nursery capacity + 26.91 (0.000) x Naturally Ventilated Nursery capacity + 23.22 (0.000) x Partially Slatted Finishing capacity + 25.64 (0.000) x Totally Slatted finishing capacity – 301.8 (0.103) x Acres of land – 1118 (0.114) x PPI (pig producer price index).

Dropping the PPI variable from the equation changed the remaining coefficients slightly but had no large effect on the overall significance of the equation or the remaining coefficients.

Conclusions and Future Research

The data indicate that a premium averaging between 18% and 46% of appraised building and equipment value was paid for swine farms in North Carolina under a *de facto* moratorium on new or expanded facilities. The average premium was largest in percentage terms for nurseries and least for finishing floors. The premiums increased over time with the exception of partially slatted finishing floors. Regression analysis indicated that the premium is positively correlated (with high statistical significance) with year of sale and with pig production capacity in each of five farm type categories and negatively correlated (with marginal statistical significance) with land area and PPI. These results are consistent with perceptions expressed by appraisers familiar with these farm sales.

More work is needed to better understand the sources of the premium. Further statistical and econometric analysis will be conducted to better model the determinants of farm sale prices and the inherent premium. Income generating capacity and physical depreciation will be tested as determinants of premium across farm types. The land acreage variable will be disaggregated into various land types and the area required for manure application may be considered in the model specification. Additional farm sales data will be used to address the question “How do land prices included in swine farm sales in four North Carolina counties compare to prices of unimproved land sales over the same time period and region?” A second question that may be addressed with additional data is “How do building and equipment prices for swine farms sold in North Carolina compare to similar facilities sold in other states that did not have a *de facto* moratorium?”

When individuals consider the sale or purchase of their business operations taxation consequences relative to the transaction are considered. The tax considerations are diametrically opposed for the buyer and seller due to the tax outcome under US tax law. The seller prefers capital gain which is to be allocated to land. The purchaser prefers to allocate the majority of the purchase price to buildings and equipment to create a large deductible depreciation expense; however, this choice results in a large tax bill for the seller because land gains are not treated the same as depreciation recapture on buildings and equipment. In theory, the purchaser and seller should agree to the allocation of the sale price to the combination of assets bought. In practice this is most often not the case because the purchaser and seller will use different tax professionals. Questions to be addressed relative to an identified premium include how the various assets are treated for tax purposes upon a sale and purchase of the same farm by two different individuals.

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References

AgWare, Inc., 2010, proprietary appraisal software producer of UAAR®, 10175 Pine Street Piedmont, SD 57769, http://www.uaar.net/index.html

Boss Hog, 2010, The Pulitzer Prizes, as viewed September, at: http://www.pulitzer.org/works/1996-Public-Service

Cameron, A. Colin and Pravin K. Trivedi; 2009, "Microeconometrics using Stata"; Stata Press

Hargreaves, Bob and Iona McCarthy, 2010, *Is New Zealand farm land worth what it will produce?* Australia and New Zealand Property Journal, June, pp 365-374

North Carolina Agricultural Statistics, 1990 through 2009, annual, selected issues, NC Dept. of Agriculture and Consumer Services, Raleigh, NC, USA.

North Carolina Animal and Poultry Waste Management Center, North Carolina State University, Raleigh, NC, USA. http://www.cals.ncsu.edu/waste_mgt/apwmc.htm

Schurle, Bryan, 1996, *The Impact of Size on Yield Variability and Crop Insurance Premiums*, Review of Agricultural Economics, Vol. 18, No. 3, pp. 415-422

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