Expected Regional Economic Impact of a New Hog Slaughtering Facility in Mason City: A Re-estimate

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Introduction

Note: This represents a restatement of the economic impact summary that was prepared for presentation when this project was first announced. The reason for the restatement and re-evaluation is two-fold: firstly, I underestimated the probability of non-agricultural regional inputs supply – I used purchasing averages from another county with a large hog slaughter facility, but as Cerro Gorda’s economy is significantly larger than that county, I did not allow for a greater range of inputs that would likely be obtained in the larger, Mason City led, regional economy. How I arrived at the values ultimately used in this report is contained in an appendix to this study.

Second, there were comments made that I’d understated the probable labor income of the plant and therefore the regional economic impacts. That concern needed to be investigated. It was, and the explanation of why I reject the Prestage data for average earnings is contained in the footnote below.

This short report estimates the expected economic impacts of a new hog slaughter facility in Mason City using the impact modeling tool, IMPLAN, as modified for this exercise.

There are some initial assumptions about the new facility:

- Lacking detailed cost of production information, information from another hog slaughtering facility was used to specify the model. In this case, total output, labor income, and other elements of value added were derived from a model of the Buena Vista County economy which houses a large hog slaughter facility.*

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* The proposing organization has provided estimates of weighted average earnings per job, however, close scrutiny reveals the estimates are unreasonably inflated: 1) they assume that average hours for their entire workforce, including administration, management and professionals are 52 hours per week – salaried workers earning over $47,500 are not eligible for overtime pay so this inflates the average; and 2) the average hours for all production workers nationally in slaughtering facilities was just under 43 hours in 2015. This firm proposes a 21 percent longer workweek than the national norm. Accordingly, this analysis relies on the observed values from an existing slaughtering facility in Iowa as the best average estimate of likely labor income to all employees. When I recalculate expected average earnings for the proposed facility using a 43 hour workweek and not allowing administration, management and professionals to receive overtime, I arrived at an expected weighted average compensation including wages, salaries, and benefits of $47,505. The numbers entered in the model were $47,809. There is no compelling reason to substitute the model numbers for the organization’s values, as I’ve recalculated them.
As there is no hog slaughtering facility in the county, the new industry has been introduced to the Cerro Gordo County economy. This analysis then uses the model’s default estimates of regional input purchases and the probability of households shopping in the county. (Note: Readers are directed to the appendix to see how I arrived at a hybrid conclusion.)

It is assumed that a plant would not locate in the county unless the region had an adequate supply of hogs; consequently, the model does not allow the county hog farming economy to grow to satisfy the plant’s needs.

Lastly, the model has been calculated using 1,000 jobs as the initial value. If the plant is larger or smaller when at full production, one merely divides the ultimate value by 1,000 to get the factor by which the subsequent results must be multiplied.

**Impact Terminology**

Before looking at the results, it is useful to have a short primer on economic impact terminology. IO models produce an array of information for analysts. For our purposes, however, there are four types of data and four levels of data comprising a typical IO results table.

The types of economic impact data are

- **Output.** This is the value of industrial productivity over the course of a year. It represents the worth of what was produced whether it was sold or not. In this case the firm’s expected sales at full operation are used as output.

- **Labor income.** These are wage and salary payments to workers, including the value of employer-provided benefits like health care and retirement. Management payments to proprietors are also counted as labor income payments. As this firm is a large family owned enterprise, it is assumed that the payments are not traditional proprietors’ incomes but are treated more like returns on investments.

- **Value added.** Value added includes all labor income (mentioned above) plus payments to investors (dividends, interests, and rents), and indirect tax payments to governments. Value added is the equivalent of Gross Domestic Product (GDP), which is the standard measure of economic activity across the states and for the nation.

- **Jobs.** There are many kinds of jobs. I-O models measure the annualized job value in different industries. Many industries have mostly full-time jobs, but many others have part-time and seasonal jobs. I-O models do not convert jobs into full-time equivalencies, but they do convert them into annualized equivalencies. As many people have more than one job, there are always more jobs in an economy than there are employed persons.

The levels of economic impact data are

- **Direct values.** These are the aforementioned data types for the industry that we are evaluating. In this study – the slaughtering facility.

- **Indirect values.** All direct firms require intermediate inputs into production. They must buy supplies, utilities, other manufactured inputs, transportation, and services, just to name a few.
Induced values. When the workers in the direct industry (the hog slaughter factory) and those in the indirect industries (the supplying sectors) convert their labor incomes into household spending, they induce a third round of economic activity. Induced values are sometimes called the household values.

Total values. The sum of direct, indirect, and induced activity constitutes the total economic effect that is being measured. In short it gives us the economic sums of the studied industry, its suppliers, and all affected households.

County-Wide Impacts
As just stated, the results are expressed per 1,000 jobs at the facility. At 1,000 workers, the plant would be assumed to have nearly $610 million in annual output and provide $47.81 million in labor income payments to those workers. The plant would require, $19.43 million in regionally supplied inputs, which would in turn require 124 jobholders earning $6.8 million in labor income. When the direct and the indirect workers converted their paychecks into household spending, they would induce another $25.03 million in regional output, which would require another 218 jobholders earning $7.9 million. Summed, the plant, per 1,000 employees, would generate $654.2 million in regional output, $106.6 million would be value added, of which $62.5 million would be labor income to 1,342 jobholders.

| Hog Slaughter Facility Economic Impacts Per 1,000 Jobs: Cerro Gordo County |
|-----------------------------|-----------------|-----------------|-----------------|
|                             | Jobs            | Labor Income    | Value Added     | Output          |
| Direct                      | 1,000           | 47,809,151      | 83,923,102      | 609,769,870     |
| Induced                     | 124             | 6,832,869       | 8,705,055       | 19,430,857      |
| Induced                     | 218             | 7,902,676       | 13,961,696      | 25,033,195      |
| Total                       | 1,342           | $62,544,696     | $106,589,853    | $654,233,922    |
| Multiplier                  | 1.34            | 1.31            | 1.27            | 1.07            |

Other Considerations
The multiplied through numbers suggest 1,342 growth in area jobs, including the 1,000 jobs at the plant. Readers are cautioned to not assume that the county’s labor force will grow by that number. Workers will live in a variety of mostly nearby places, and Mason City residents have the luxury, too, of working in a variety of nearby places. Using data from the Census Bureau, for example, we know that 59.6 percent of the employed people living in Mason City actually work in Mason City – the remaining 40 percent work elsewhere. Furthermore, of all job holders working in Mason City, just 42.6 percent are city residents – the majority of the city’s jobholders live outside of the city. When considering the probability of area growth, any new job in an area can be filled under the following circumstances:

1. An unemployed resident takes a job
2. A current outcommuter takes a job
3. A nonresident incommuter takes a job
4. A local resident enters the workforce and takes a job
5. A person moves to Cerro Gordo County and takes a job
It is only the last instance that results in regional household growth.

Accordingly, one must be circumspect about regional residential growth likelihoods. That growth will be tempered by several factors, the first of which has just been mentioned: the probability of a payroll job in Mason City being filled by a Mason City resident is historically about 50 percent. Secondly, one must look at the total value of all of the jobs created under this scenario. If those jobs pay better than the area average, then we might see a boost in immigration beyond historical values. If those jobs pay less than the area average for all jobs, then one would not expect immigration levels to exceed historical experiences.

The average earnings for all multiplied-through jobs in this exercise were $46,618, just 81 percent of the countywide average of $57,582 for all jobs (remember earnings include wages, salaries, and the value of all received employment benefits like health care and retirement). This lower level of aggregate compensation across all job impacts will work to

- Dampen in-migration into the community
- Yield lower than probably expected city and countywide housing needs
- Likely disperse the new workforce throughout the county as well as into neighboring areas
- Not produce net local government fiscal gains (via all taxes paid by the new workers). This assumes that the average new household stimulated from the economic impact will consume more local government services than it is able to support through local taxes.
Appendix: Comparing Two Modeling Approaches to Estimating the Economic Impact of a New Hog Slaughter Facility in Mason City, Iowa

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Set-up and Background

A proposed hog slaughter facility in Mason City was recently evaluated by me to estimate the likely economic impact the facility might have on the regional economy. As there was no hog slaughter facility in the region, the modeling system, IMPLAN, required the introduction of the sector to the county. There are two approaches to this:

Approach 1: One inputs the basic characteristics of production per job (output, earnings, returns to investors, etc.) if one can discern them, and then lets the model calculate the expected production functions.

Approach 2: One does input the basic characteristics of production per job, as in approach 1, but then also imports the production functions from a region where there is animal slaughter prominence. This approach uses existing production specialization as the foundation for the new facility

As Mason City did not possess hog slaughtering prominence, I chose Approach 2. Storm Lake, Iowa, in Buena Vista County, has a Tyson hog slaughtering facility, which has been in operation for several decades, and the production characteristics of that industry in that county were used as a template for the Mason City analysis. The plant was similar in size to what has been proposed, it has a skilled and well-compensated workforce, and finally the region’s supply chain into the plant is also developed and mature and should reflect the expected inputs demanded by the slaughtering facility.

Both models were initially specified using average output, labor income, and returns to investor characteristics as exhibited in the Storm Lake example. After all other prudent offsets were made, such as not allowing the facility to create new hogs in the region, and therefore count economic activity that was already here, the county-wide economic impacts for the region for both approaches are contained in the following table.

The Approach 2 values were used in my public presentations on the new facility with an assumption the plant would have 1,000 workers. Using 1,000 workers as the base is not a problem as the modeling results are linear, and if the plant is twice as large, then one simply multiplies the results times two. Using a per-1,000 jobs at the plant basis makes for an intuitively clear evaluation of impacts as a facility comes on line and ultimately works its way to full production.
Approach 1, which allows the county economy as specified explicitly in the model to adapt to the new industry without any other significant modification produces greater economic impacts, assumes a more robust set of inputs linkages with the regional economy, at $26.9 million of stimulated indirect purchases, than the second approach, which uses the historically-informed production functions from the Buena Vista County template. Accordingly, as the indirect input impacts are greater, there too are greater impacts in the induced (the household) component as there are more workers spending their paychecks in the regional economy.

The multipliers are, as would be expected, higher for Approach 1, but the multiplied-through average earnings of all jobs stimulated by the new plant are slightly higher in Approach 2.

### Prestage Economic Impacts Using Approach 1

<table>
<thead>
<tr>
<th></th>
<th>Jobs</th>
<th>Labor Income</th>
<th>Value Added</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>1,000</td>
<td>47,809,151</td>
<td>83,923,102</td>
<td>609,769,870</td>
</tr>
<tr>
<td>Indirect</td>
<td>182</td>
<td>9,888,157</td>
<td>13,438,664</td>
<td>26,869,747</td>
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<tr>
<td>Induced</td>
<td>262</td>
<td>9,405,321</td>
<td>16,415,068</td>
<td>29,604,716</td>
</tr>
<tr>
<td>Total</td>
<td>1,444</td>
<td>$67,102,629</td>
<td>$113,776,834</td>
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</tbody>
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Multiplier: 1.44
Average Earnings Per All Jobs: $46,460

### Prestage Economic Impacts Using Approach 2

<table>
<thead>
<tr>
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<th>Jobs</th>
<th>Labor Income</th>
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<td>609,769,870</td>
</tr>
<tr>
<td>Indirect</td>
<td>66</td>
<td>3,777,580</td>
<td>3,971,445</td>
<td>11,991,967</td>
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<tr>
<td>Induced</td>
<td>173</td>
<td>6,400,031</td>
<td>11,508,324</td>
<td>20,461,673</td>
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<tr>
<td>Total</td>
<td>1,239</td>
<td>$57,986,762</td>
<td>$99,402,871</td>
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</tbody>
</table>

Multiplier: 1.24
Average Earnings Per All Jobs: $46,801

There were comments that my public presentation under-estimated the impacts because I did not use the compensation levels that Prestage had indicated it would pay, and if Prestage in fact does provide average compensation to all workers in excess of what I have estimated, then the impacts would increase slightly. I found those concerns to be unwarranted (as explained on the footnote on page 1 of this report).

More pertinent is the difference between the two results. It is therefore useful to compare my presented results with those that would have come from the model had I not attempted to inject more rigor into the estimation process by over-riding its default assumptions.
Evaluation of the Respective Approaches
Approach 1 is both easier and mostly reasonable on the surface, all things equal. It lets the regional economy adapt to the new plant and allows existing model averages to guide the process. Approach 2 is harder to compute and forces the new plant to behave like an existing plant in a more or less similar production situation or region. Approach 1 lets the model drive the resulting impacts whereas Approach 2 lets the modeler inject a degree of real-world experience and outcomes, albeit subjective, into the estimation process.

Which is to be preferred?
The answer is that both have flaws. We have learned over the years that the introduction of new types of manufacturing to a region rarely results in the regional supply chain growth assumed by the modeling system. As Iowa is a food products powerhouse, one would expect that specialized suppliers to a slaughtering facility (industrial machinery, packaging materials, warehousing, refrigeration, and transportation) already exist and would simply accommodate the new firm’s requirements without necessarily building new facilities regionally. Many studies bear this out. Hence, the justification of Approach 2: this new plant should act like a similarly sized facility already producing in Iowa, and not like the modeling system presumes.

Approach 2, however, has its flaws as also did I in applying it. In adopting the Buena Vista County production functions, I implicitly weighted more heavily the large supply of animals in the county, which in turn reduced the expected purchases of other regional input as a fraction of all inputs. The Cerro Gordo County economy does not have anywhere near the hog supply as Buena Vista County, and not adjusting for those percentages differences resulted in my underweighting local non-agricultural inputs purchased from Cerro Gordo County.

Furthermore, as just demonstrated, all economies are different, and the Cerro Gordo County / Mason City economy is larger than the Buena Vista County / Storm Lake economy, and that in and of itself would yield higher overall expected multipliers.

What to do?
While I prefer Approach 2, and having reviewed my work know how to fine tune that approach even further, I conclude that it is still potentially too stingy in terms of expected regional input demands. Approach one, however, is procedurally reasonable, yet it produces, in my opinion, too robust inputs linkages. Approach 1 benefits from not being tainted by subjectivity – that of the analyst injecting specific expected relationships into a model that assumes broad averages. But it suffers in that it assumes economic activity will be created regionally that experience suggests is not likely.

The easiest solution in this case is to average the two approaches. Allowing the more robustness of Approach 1 to compensate for the stinginess of Approach 2 to yield a compromise table. Hence, the following table represents by best estimate of the expected regional economic impacts of the proposed plant for Mason City and Cerro Gordo County.
### Prestage Economic Impacts Averaging Both Approaches

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Multiplier

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<th>Overall</th>
</tr>
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<td>Jobs</td>
<td>1.34</td>
<td>1.31</td>
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Average Earnings Per All Jobs $46,618

### Concluding Comments

Impact models produce estimates. They are only as good as the information one brings to the analysis, the underlying structure of the model, and the assumptions and procedures used by the analyst. The goal of these efforts is to help local decision makers understand the likely changes their economy and their communities may realize.

The models are not feasibility studies, nor do they tell whether or not a firm out to receive public assistance. Economic impact models do not provide guidance as to those types of decisions as they are usually purely political and rarely informed by sound economic principles. The findings in this analysis justify nothing regarding firm location or public subsidy, but they do allow local decision makers and citizens to understand the potential consequences of their choices.