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Federal Order 33

TRANSPORTATION ANALYSIS FOR PRODUCER MILK ASSOCIATED WITH THE MIDEAST ORDER

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Staff Paper
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Transportation Analysis for Producer Milk Associated With the Mideast Order May 2009

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This staff paper details the hauling assessments paid by producers, and the delivery distance to the first delivery point, of milk marketed by producers associated with the Mideast Marketing Area, Federal Order 33, for May 2009. The results show that hauling assessments vary significantly due to multiple factors including delivery volume and competitive groups of producers and handlers. Large farms pooled on the Mideast Marketing Area face diminishing marginal costs relating to transportation charges.

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TRANSPORTATION ANALYSIS FOR PRODUCER MILK ASSOCIATED WITH THE MIDEAST ORDER MAY 2009

By John Newton

Introduction

This study analyzes the hauling assessments paid by milk producers and the delivery distance to the first delivery point for milk marketed by producers associated with the Mideast Marketing Area, Federal Order 33, for May 2009.[1]

The hauling assessments and delivery distances were analyzed to determine the weighted average hauling assessment, the weighted average hauling assessment per hundredweight (cwt), the weighted average delivery distance, and the weighted average mileage rate factor (MRF). Additionally, the transportation variables were evaluated using production region (state) and producer size characteristics. An effort was also made to identify a statistical relationship among the hauling assessments as a function of delivery volume, delivery distance, and the competition among other variables.

In May 2009, there were a total of 7,230 producer farms associated with the market; hauling information was analyzed for 5,933 of these producer farms. The geographical region encompassed in this population includes: Ohio, Michigan, Indiana, West Virginia, Pennsylvania, Kentucky, Illinois, Maryland, New York and Wisconsin.

Background

This staff paper builds on previous work performed by Mideast staff. In April 2008 the Mideast Market Administrator's Office released staff paper 08-02 which included hauling assessment per cwt, delivery distance and mileage rate factor statistics for April 2007. A subsequent transportation analysis for May 2008 was also conducted detailing the hauling assessment, delivery distance and mileage rate factor among other statistics. Results of both

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[1] Hauling assessments represent the transportation costs incurred by the milk producer when transporting milk from the farm to the processor. Hauling assessments may not represent the total costs of milk delivery from the farm, as hauling assessments reflected on producer payrolls are often subsidized.

analyses indicated that hauling assessments paid by producers were subject to delivery volume, delivery distance and competition for milk supplies.

Variations of this study are performed by Dairy Programs staff in both the Upper Midwest and Pacific Northwest Orders for producers associated with those marketing areas.

At the time of this analysis the staff paper published by the Pacific Northwest indicated that the weighted average hauling assessment was 53.40 cents per cwt for May 2009. Similarly, Upper Midwest research indicated that the weighted average hauling assessment was 29.84 cents per cwt for May 2009.[2]

In addition to the staff papers published by the Upper Midwest and Pacific Northwest, the New York Department of Agriculture and the California Department of Food and Agriculture conduct similar hauling analyses.

The Milk Hauling Study conducted by the New York Department of Agriculture (2008) indicated that milk hauling costs in New York are partially determined by the number of farm pickups per day and the delivery distance. Annual average hauling assessments ranged from 50 to 60 cents per cwt from 1991 through 2008. More recent information, calculated using January through March 2009 data, indicated that producer hauling and stop charges averaged 58 cents per cwt in the New York marketing area.

The ranch-to-plant portion of the California milk hauling study (2009) indicated that hauling assessments per cwt averaged 44.53 cents per cwt in March 2008 and 44.73 cents per cwt in October 2008. The California hauling study is based on hauler invoices supplied by the dairy cooperatives operating in that market. The per cwt assessment calculated included stop charges, surcharges and weight charges paid by producers at the ranch.

Comparisons made to hauling and stop charge assessments in other marketing areas/states do not indicate a difference in the actual milk hauling costs; rather, they serve only to denote the differences in assessments paid by producers in each marketing area/state.

Related Studies

Over the years economists have conducted analyses relating to hauling costs and bulk milk assembly costs. Jacobson and Fairchild (1969) defined the hauling assessments as a linear function of the volume of milk transported, where the intercept represented the stop charge paid by the producer and costs increased uniformly per cwt delivered. This analysis estimated that transportation costs were linear and that average costs and marginal costs were equal.

In 1993 Gallagher, Thraen and Schnitkey estimated a translogarithmic total cost function using survey data from Ohio producers and found that total cost is substantially lower for delivery volume output relative to delivery distance output. Gallagher et al. found that cost functions based strictly on delivery volume or on volume per mile driven would substantially over-charge large volume producers and under-charge small volume producers – representing a situation where large producers would subsidize the transportation of their smaller counterparts.

[2] The geographical region represented in the analysis conducted by the Pacific Northwest office includes California, Idaho, Oregon, Utah and Washington. The geographical region represented in the 2009 analysis conducted by the Upper Midwest office includes Illinois, Iowa, Michigan, Minnesota, North Dakota, South Dakota and Wisconsin.

By arguing that a majority of the costs of transporting milk are incurred prior to and during milk pickup, Gallagher et al. suggested that the milk assembly process, not transportation, was the most expensive part of milk transportation; thus, stop charges were significantly undervalued and volume assessments were overvalued.

In 1996, a report issued by the Agricultural, Resource and Managerial Economics Department at Cornell University provided a detailed assessment of the milk hauling sector of the United States. In that publication Pratt and Guiguet concluded that the structure of the hauling industry reflected not only technological changes in the industry, but also industry consolidation where fewer and larger farms were serviced by fewer and larger hauling firms.

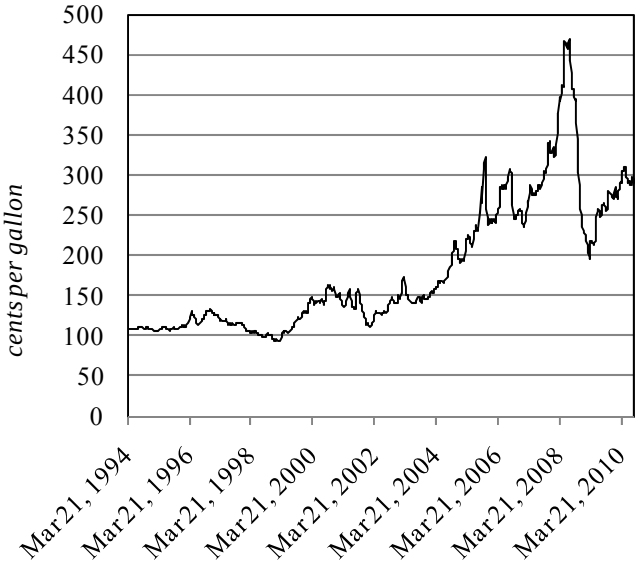
Several problem areas that constrain hauling efficiency were also identified. Such constraints include but are not limited to: government limitations on load size and labor hours, limitations related to haulers "owning" their routes, road conditions, milk co-mingling, route overlapping and milk unloading and rinsing times. Due to the constraints identified as well as other hauling limitations such as unreliable daily processor demand, milk hauling continues to be an expensive component in the dairy product supply chain.

In a subsequent report examining the characteristics of milk assembly Erba along with Pratt, Wasserman and Alexander (1998) noted that milk hauling assessments were determined through negotiations based on factors such as route mileage, number of farm pickups, farm location and delivery point. Erba et al. noted, however, that when contracting a hauler for a milk route, producers may not choose the best available rate; instead choosing a hauler based on a hauler's performance, personal relationship, accuracy of milk weights, delivery time and sampling techniques.

Collectively, the results of the aforementioned studies indicate that while hauling assessments vary depending on factors such as delivery volume, route mileage, and farm pickups; hauling assessments also are subject to discrete factors such as the hauler-producer relationship.

Another factor influencing transportation costs is the price of fuel. Diesel prices represent only a fraction of the total transportation costs; but the volatility in diesel prices makes the costs of supplying milk very unpredictable. When fuel prices soared in 2006-2008 there was industry pressure to address diesel prices and their impact on milk transportation. Results of that pressure lead to industry hearings to adjust the Class I differential price surface in southeastern U.S. and implementation of a variable mileage rate factor for transportation credits in the Southeast and Appalachian orders.

Figure 1 displays the weekly average diesel rates for the Midwest Petroleum Administration for Defense Districts (PADD II Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota,



Source: Energy Information Administration

Figure 1. Midwest (PADD II) Diesel Retail Price by All Sellers

Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee and Wisconsin).[3] PADD II most accurately represents the states included in the Mideast Marketing Area. Announced PADD I (Sub district IC) and PADD III are used to determine the variable mileage rate factor for the Appalachian, Southeast and Florida Orders.[4]

Volatile transportation costs and shifting supply and demand conditions make transporting milk very expensive. Producers, handlers, haulers and cooperatives all share in the costs of moving raw milk and finished goods along the supply chain through assessments, the class I differential price surface, surcharges, premiums and transportation credits. For the purpose of this study no attempt was made to analyze fuel surcharges, premiums, or transportation credits.

Data and Methodology

The data was collected from producer payrolls submitted by handlers and cooperatives to the Mideast Market Administrator's Office. As handlers and cooperatives generally submit their entire payrolls, the data not only includes producer milk pooled on the Mideast Order, but also milk pooled on other Orders and milk associated with the market but not pooled due to price fluctuations and/or price relationships among Federal Orders. For the purpose of this study, the hauling and delivery data associated with those producers with de-pooled milk was included. Producers who appeared on the payrolls submitted to this office but who did not pool milk on Federal Order 33 were not included in this analysis. Several of the cooperatives pooling on the

[3] Published by the Energy Information Administration (www.eia.doe.gov)
[4] The variable mileage rate factor shifts in relation to fuel prices and determines the monthly payout per cwt for milk eligible to receive transportation credits in the Appalachian and Southeast Orders.

Mideast Order do not submit their payrolls electronically. Data not submitted electronically was omitted from this analysis. As a result, there is a significant difference in the number of producers and delivery volume in this study and the number of producers and delivery volume as pooled on the Mideast Federal Order during May 2009.

Hauling assessments are identified as the hauling deductions shown on the producer payrolls submitted to the Market Administrator's Office. The hauling deductions represent the transportation costs incurred by the milk producer when transporting raw milk from the farm. Many of the observed assessments likely include stop charges incurred by the milk producer - stop charges are a function of farm pickups and do not represent farm to plant transportation expenses. The hauling assessments appearing on the producer payrolls do not reflect the actual cost of milk transportation; nor do they necessarily reflect the total costs of farm pickup and delivery to the plant. As observed by Freije (2008), hauling assessments reflected on producer payrolls often are subsidized to some extent.

For this study delivery distances were approximated using the shortest hard surface highway distance from the county seat of the applicable producer to the actual location of the receiving plant. No attempt was made to account for milk reloads or to estimate milk assembly miles. Assembly miles are miles traveled to collect the raw milk, assembly miles plus the distance from the last farm pickup to the receiving plant would represent total delivery miles (Gallagher et al.).

The MRF was calculated by dividing the hauling assessments per cwt by the delivery distance. The MRF represents the per cwt per mile assessments paid by producers for transporting milk. For the purposes of this analysis weighted average MRFs are given by the equation:

$$m_i = 100\left(\frac{\sum_{i=1}^{n}\frac{y_i}{z_i}}{\sum_{i=1}^{n}x_i}\right);$$

where for producer *i*,

x = delivery pounds

y = hauling assessment

z = delivery distance

m = is the weighted average mileage rate factor. It is the opinion of this researcher that calculating the MRF for each producer provides a more accurate measurement of per cwt per mile hauling assessments.

The descriptive statistics detailed in this analysis include weighted average, mean, standard deviation and where applicable the minimum and maximum values observed in the data population. Weighted averages are given by the equation:

$$\bar{x} = \frac{p_1x_1 + p_2x_2 + \ldots + p_ix_i}{p_1 + p_2 + \ldots + p_i}$$

where for producer *i*

x = the applicable transportation variable (hauling assessment, delivery distance or mileage rate factor)

p = delivery volume

Calculating the weighted average allows producers with little or no production volume to contribute less to the weighted mean than producers with a high production volume.

The data population was also analyzed using Ordinary Least Squares (OLS) regression analysis. OLS was used to determine the hauling assessment as a function of delivery volume, delivery distance, quantity of surrounding producers and the effect of surrounding plants (pool and non pool) among other variables.

Descriptive Statistics for May 2009

For May 2009, total hauling assessments paid by producers included in this analysis was approximately 5.8 million dollars, a reduction of 4.6 percent from May 2008 assessments of 6.0 million dollars.

Table 1. Descriptive Statistics

Variable	May 2009	May 2008	April 2007
Hauling Assessment ($)			
Weighted Average	4,230.05	4,332.92	3,205.74
Mean	1,024.39	1,019.42	850.53
SD	1,603.54	1,672.21	1,225.22
Max	31,564.29	45,431.98	*
Min	3.03	15.77	*
Hauling Assessment ($/cwt)			
Weighted Average	0.4772	0.5032	0.4587
Mean	0.6876	0.6909	0.6095
SD	0.3729	0.3676	0.2659
Max	8.5121	6.3142	*
Min	0.0060	0.0100	*
Delivery Distance (miles)			
Weighted Average	102.7	88.4	86.8
Mean	80.8	68.0	69.2
SD	78.5	58.2	58.4
Max	524.1	413.7	*
Min	0.2	0.7	*
Mileage Rate Factor ($/cwt/mile)			
Weighted Average	0.01609	0.01582	0.00529
Mean	0.02837	0.02629	0.00880
SD	0.11459	0.08219	0.00455
Max	3.67799	2.82251	*
Min	0.00004	0.00005	*

* Information unavailable.

The market wide May 2009 weighted average hauling assessment was $4,230.05, $102.87 less than May 2008. The weighted average hauling assessment per cwt was 47.72 cents, 2.6 cents less than May 2008.

The weighted average delivery distance was 102.7 miles, 14.3 miles greater than the May 2008 weighted average.

The weighted average MRF was 1.61 cents per cwt per mile, marginally higher than May 2008. For comparative purposes Table 1 contains descriptive statistics for May 2009 and 2008 as well as April 2007. The weighted average calculation puts comparatively less weight on producers with little delivery volume. Therefore, when comparing the weighted average and the mean for each category it becomes apparent that smaller producers tend to have lower hauling assessments, higher hauling assessments per cwt, shorter delivery distances and higher per cwt per mile hauling assessments.

Transportation Analysis by State

For this section transportation statistics were analyzed by the production region. Milk from ten states was included in this analysis; of the ten states, Ohio, Michigan, Indiana, West Virginia, Kentucky and Pennsylvania are states located or partially located within the Mideast Marketing Area.

Producer size varies dramatically throughout the region. Producer size is estimated using average delivery volume. Average delivery volume ranges from 66,022 pounds for producers in Maryland to 327,868 pounds for Michigan producers.

Table 2. State Transportation Statistics

State	Total Delivery Pounds	Average Delivery Pounds	Hauling Assessment *($)*	Hauling Assessment *($/cwt)*	Delivery Distance *(miles)*	Mileage Rate Factor *($/cwt/mile)*
Illinois	6,451,463	161,287	2,533.88	0.435	42.28	0.0108
Indiana	149,690,900	154,003	3,016.43	0.572	88.10	0.0274
Kentucky	2,649,627	75,704	1,057.57	0.841	89.77	0.0123
Maryland	2,508,833	66,022	907.54	1.058	103.46	0.0180
Michigan	598,358,560	327,868	5,327.68	0.419	117.02	0.0100
New York	25,249,753	290,227	4,391.63	0.564	80.96	0.0120
Ohio	321,270,630	190,439	3,805.18	0.498	87.10	0.0160
Pennsylvania	60,754,499	97,519	1,677.32	0.800	129.67	0.0212
West Virginia	6,042,774	92,966	1,290.93	0.815	142.84	0.0189
Wisconsin	36,353,265	139,285	319.68	0.143	39.65	0.0656
Total	1,209,330,304					
Weighted Average			4,230.05	0.477	102.69	0.0161

Maryland had the smallest volume of milk included in this analysis with only 2.5 million pounds, 0.21 percent of the total. Michigan had the largest volume of milk included in this analysis with 598 million pounds, 49.48 percent of the total. The states included in the Mideast marketing area represented approximately 94 percent of the milk included in this analysis.

Table 2 details the transportation statistics by state for May 2009. Michigan had the highest weighted average hauling assessment at $5,327.68, which was $1,097.63 more than the market weighted average. Wisconsin had the lowest weighted average hauling assessment at $319.68, which was $3,910.37 less than the market weighted average.

Weighted average hauling assessments per cwt ranged from $0.14 for Wisconsin producers to $1.06 for producers in Maryland. The low weighted average hauling assessment observed for Wisconsin is supported by the findings of the Upper Midwest marketing area. Research by the Upper Midwest indicated that weighted average hauling assessments per cwt for Wisconsin producers ranged from 6.74 to 26.83 cents depending on delivery volume. There is a significant difference in the hauling assessment for Wisconsin producers compared to producers in other states. Stop and volume assessments often are used as negotiating tools by cooperatives, handlers and haulers when attempting to procure additional milk supplies. Since Wisconsin has a large population of dairy producers within close proximity of each other it is likely that the competitive landscape (agglomeration effect) has helped to drive down hauling assessments for producers in that region.[5] Another contributor to the low hauling assessments could be the low weighted average delivery distance associated with Wisconsin milk.

Weighted average delivery distances ranged from a low of 39.65 miles for producers in Wisconsin to 142.84 miles for producers in West Virginia. Delivery distance is a function of pooling practices and supply locations. For example, a portion of the milk from states outside the marketing area is diverted milk pooled on the Mideast Order but not delivered to facilities located within the Mideast geographical region, which may result in a lower weighted average delivery distance. Additionally, Michigan and Indiana historically have high weighted average delivery distances because they contain the reserve supplies of milk needed to meet the fluid milk demands in southern portions of the Mideast marketing area and in the southeastern portions of the U.S.

Weighted average MRF ranged from a low of 1.0 cents per cwt per mile for Michigan producers to a high of 6.5 cents per cwt per mile for Wisconsin producers.

When interpreting the state statistics consider that the data only applies to milk associated with the Mideast marketing area; as a result, transportation statistics presented in this analysis may not be representative of all milk marketed in a particular state.

Transportation Analysis by Producer Size

In order to examine the impact producer size has on hauling assessments and delivery distance, producers associated with the marketing area were divided into 10 equally sized

[5] For May 2009 there were approximately 13,418 Wisconsin producers associated with the Upper Midwest marketing area.

Table 3. Percentile Group Transportation Statistics

Percentile Group	Delivery Pounds	Average Delivery Pounds	Hauling Assessment ($)	Hauling Assessment ($/cwt)	Delivery Distance (miles)	Mileage Rate Factor ($/cwt/mile)
One	10,146,627	18,054	210.03	1.091	91.79	0.0531
Two	19,270,441	34,228	271.37	0.788	85.30	0.0329
Three	26,376,678	46,850	344.00	0.731	74.33	0.0251
Four	34,394,465	61,091	440.62	0.718	79.59	0.0285
Five	44,520,295	79,077	529.02	0.667	76.41	0.0257
Six	58,261,350	103,484	657.97	0.634	70.84	0.0308
Seven	76,752,244	136,327	824.00	0.600	80.32	0.0223
Eight	108,282,559	192,331	1,072.86	0.551	77.26	0.0213
Nine	169,532,410	301,123	1,664.00	0.541	79.62	0.0206
Ten	661,793,235	1,167,184	6,891.17	0.367	122.93	0.0094
Total	1,209,330,304					
Weighted Average			4,230.05	0.477	102.69	0.0161

percentile groups. Percentile groups were determined using producer identification codes and delivery volume.

There were 5,933 producers included in this study, so each percentile group contained 593 producers based on milk volume. Percentile group one represents producers with the smallest delivery volume and group ten represents producers with the largest delivery volume. In order to put the percentile group measurements into perspective it must be considered that producers in percentile group one averaged deliveries of 18,054 pounds and supplied 0.84 percent of the milk in this analysis; while producers in percentile group ten averaged deliveries of 1,167,184 pounds and supplied 54.72 percent of the milk in this analysis. Additionally, the top three percentile groups supplied approximately 77.7 percent of the milk included in this analysis.

Weighted average hauling assessments by percentile group ranged from $210.03 for producers in percentile group one to $6,891.17 for producers in percentile group ten. Of the 5.8 million dollars paid by the producers included in this study, producers in the largest percentile group paid 2.4 million dollars, approximately 42 percent of the total.

Weighted average hauling assessments per cwt ranged from $1.09 per cwt for producers in percentile group one to 36.69 cents per cwt for producers in percentile group ten. Hauling assessments per cwt decreased incrementally from percentile group one to percentile group ten.

Similar relationships between the hauling assessment and delivery volume were also observed in the findings of Freije and Espe.

Weighted average delivery distances ranged from a low of 70.84 miles for producers in percentile group six to 122.93 miles for producers in percentile group ten. Weighted average delivery distances did not vary considerably among percentile groups one through nine. The significant increase in the weighted average delivery distance for producers in percentile group ten is likely a function of multiple factors such as their ability to deliver by the tanker.

Weighted average MRF ranged from 0.94 cents per cwt per mile for producers in percentile group ten to 5.31 cents per cwt per mile for producers in percentile group one.

Transportation Analysis by Subgroup[6]

For this section, the data was divided into multiple subgroups. Each subgroup was analyzed to determine the weighted average hauling assessments and the weighted average delivery distance. Specifically of interest was how the transportation statistics varied from state to state among homogenously sized producer groups.

Producers were grouped within each state based on the following aggregate delivery criteria less than 60,000 pounds; between 60,000 and 90,000 pounds; between 90,000 and 125,000 pounds; between 125,000 and 190,000 pounds; between 190,000 and 250,000 pounds; between 250,000 and 500,000 pounds; between 500,000 and one million pounds; between one million and two million pounds and more than two million pounds.

The weighted average hauling assessment by subgroup ranged from a low of $158.23 for Wisconsin producers shipping less than 60,000 pounds to a high of $12,417.93 for Ohio producers delivering more than 2 million pounds. In all states except Illinois the weighted average hauling assessment increased as delivery volume increased.

The weighted average hauling assessment per cwt ranged from a low of $0.068 for Wisconsin producers delivering between 500,000 and one million pounds to a high of $1.199 for Maryland producers delivering less than 60,000 pounds. When analyzing hauling assessments per cwt it is apparent that as delivery volume increases, per cwt fees decrease.

Weighted average delivery distance did not have an observable correlation with delivery volume. Weighted average delivery distance ranged from a low of 28.26 miles for Illinois producers delivering 250,000 to 500,000 pounds to a high of 191.13 miles for Indiana producers delivering more than two million pounds.

The MRF is a function of the ability to spread the transportation costs over a quantity of miles. The higher the denominator the lower the MRF will be. Therefore, when comparing weighted average hauling assessments per cwt and weighted average delivery distances, weighted average MRF values by subgroup are not surprising. Since the largest producer groups have the lowest weighted average hauling assessments per cwt, and they generally have the longest weighted average delivery distance, their MRF are expected to be very small. Weighted average MRFs range from 0.14 cents per cwt per mile for Indiana producers delivering more than two million pounds to 17.62 cents per cwt per mile for Wisconsin producers delivering less than 60,000 pounds.

The transportation disparities among homogenously sized producers from state to state are likely due to multiple factors within each state. Factors could include transportation regulations, distance to the Class I market, pooling practices of producers within each state, and the competition for milk supplies in the market among others.

[6] Appendix B contains a table detailing select transportation statistics by subgroup.

Assessment Models

For this section OLS regression analysis was used to quantify the relationship between hauling assessments and delivery volume, delivery distance, quantity of surrounding producers, proximity of the nearest fluid or manufacturing plant and topography. The model included a squared coefficient for delivery volume to capture the diminishing marginal cost of hauling assessments relative to milk pounds delivered.

The hauling equation is given by:

$$ha_i = \beta_0 + \beta_1 p_i + \beta_2 p_i^2 + \beta_3 m_i + \beta_4 cl_i + \beta_5 t + \beta_6 U_{10i} + \beta_7 U_{50i} + \varepsilon_i$$

where for producer i (i = 1,…5,633):

ha = represents the hauling assessment as reflected on the producer payroll
p = represents total delivery pounds
m = represents delivery distance in miles
cl = represents the quantity of producers in the same county
t = (discrete variable to capture the effect of topography, 1 = sloped terrain, 0 = flat terrain)
U_{10} = (discrete variable to capture the effect proximity of a processing plant (1 = plant within ten miles; 0 = no handler within ten miles)
U_{50} = (discrete variable to capture the effect proximity of a processing plant (1 = plant within 10-50 miles; 0 = no handler within 10-50 miles)

White's Test

As producer delivery volume increases the variability in hauling assessments increases, indicating that the variance of the error term is not constant across the data population. The possibility of heteroskedasticity must be considered for this analysis. Results of a White's Heteroskedasticity Test were greater than the critical chi squared value, so the null hypothesis of constant error terms was rejected, indicating the presence of heteroskedasticity. In order to account for this problem, White's heteroskedasticity corrected standard errors were estimated. Since heteroskedasticity does not bias the OLS estimates, the coefficients values did not change as a result of this correction.

Table 4. Determinants of Hauling Assessment

Equation	Intercept	P	P^2	M	M*T	T	CL	U_{10}	U_{50}	Adjusted R^2	F-statistic
1	480.59 *	0.002798 *		0.0983			-0.8348 *			0.724	4,931.8
2	231.50 *	0.004428 *	-3.78E-10 *	0.2013			-0.7441 *			0.794	5,437.1
3	345.89 *	0.004435 *	-3.79E-10 *	0.0010			-0.7079 *	-195.43 *	-95.73 *	0.795	3,648.7
4	190.22 *	0.004456 *	-3.81E-10 *	0.1516		125.7 *	-0.7522 *			0.796	4,384.4
5	192.95 *	0.004458 *	-3.81E-10 *	0.1033	0.1466	113.5 *	-0.7408 *			0.796	3,653.2
6	320.40 *	0.004468 *	-3.82E-10 *	-0.1675	0.3028	105.8 *	-0.6907 *	-209.77 *	-107.58 *	0.797	2,760.5

Note: Single (*) asterisk indicates a computed t-value greater than the critical t-value at α=.05.

Model Result

The higher hauling assessments paid by large producers appears to be a function of the volume of milk being transported. The results of model one indicates a volume assessment of approximately $0.2798 per cwt. When the pounds squared term is included in the model estimation the volume assessment increases to approximately $0.44 per cwt. Pounds squared carries a negative coefficient, indicating that there is a marginal decrease in hauling assessments as delivery volume increases. The scale of the pounds squared coefficient is very small, but non zero. Using the mean terms for the hauling assessment and the delivery volume the elasticity of the hauling assessment with respect to the delivery volume is given below:

$$\mathrm{E}_{ha,p} = \frac{\partial ha}{\partial p} \times \frac{p}{ha} = \left(0.004468 - 7.64E-10(214{,}687)\right) \times \frac{214{,}687}{1{,}024.39} = 0.9020$$

where:

$$\frac{\partial ha}{\partial p} = \left(\beta_1 + 2\beta_2 p\right),$$

and p and ha are the respective mean values for delivery volume and the hauling assessment. A one percent change in delivery volume results in a 0.902 percent change in the hauling assessment, holding all else constant.

In order to quantify the effect delivery distance has on hauling assessments, a variable capturing delivery distance was incorporated into the models. In previous hauling analyses conducted by this office delivery distance was statistically positive, with coefficients ranging from $0.39 to $1.81 per mile, holding all else constant. Unlike previous assessment models, delivery distance was not statistically significant at the 95 percent confidence level. The calculated p-values for delivery distance were generally greater than 29 percent depending on the

model. Using the same methodology to calculate the elasticity of hauling assessments with respect to delivery volume, the hauling assessment-elasticity of delivery distance was calculated at 0.0107 (if t=1) and -0.013 (if t=0); indicating that for May 2009 hauling assessments are not significantly impacted by changes in delivery distance.

In the previous transportation analyses the hypothesis was made that distance was not homogenous (e.g. one mile traveled in eastern Ohio which borders the Appalachian Mountains does not equate to one mile traveled in the western Ohio plains). In order to test this hypothesis, a discrete variable capturing topography and an interaction term with delivery distance were incorporated into the model. The discrete variable measuring topography was statistically positive with coefficients ranging from $105.80 to $130.00, holding all else constant. The statistically positive coefficient for topography indicates that hauling assessments increase for producers located in counties with sloped terrain. The interaction term (mileage and topography) was included in two of the assessment models. In both models the interaction term was not statistically significant at the 95 percent confidence level.

It is appropriate that counties with a large population of milk producers have lower hauling assessments due to increased competition - the significantly negative coefficient for producer cluster supports this conclusion. The coefficients measuring the impact of an additional producer in a county range from -0.8348 to -0.6907; the significantly negative values indicate that the presence of an additional dairy producer in a county will lower the total hauling assessment paid by a producer in the same county by approximately 69-83 cents, holding all else constant. This relationship is identified as the agglomeration or network effect, where the benefits obtained when locating near each other can be used to drive down prices (hauling assessments) through competition. Concentrated groups of farmers attract more handlers, haulers or cooperatives attempting to procure the milk than a single farm alone. For future analysis the network effect will be tested to determine if delivery volume significantly changes the network effect. Including a volume and producer count interaction term will allow for the network externality to benefit each producer differently based on their unique delivery volume. The results will identify whether or not large producers receive greater positive externalities (benefits of location) than their smaller counterparts operating in the same region.

In order to capture the effect of a nearby processing facility, discrete variables were incorporated for plants located within 10 miles and for plants located with 10-50 miles. The presence of a processing plant within 10 miles was statistically negative with coefficients ranging from -$195.43 to -$209.52, holding all else constant. The presence of a processing plant between 10 and 50 miles was also statistically negative with coefficients ranging from -$95.73 to -$107.58, holding all else constant. The inclusion of the discrete variables capturing nearby processing facilities, and a comparison of the coefficients for both discrete terms, indicates that hauling assessments decrease the closer a producer is to a processing facility, holding all else constant.

In summary, OLS regression analysis indicated that hauling assssments were statistically dependent on delivery volume, topography, number of surrounding producers and proximity to a

processing plant; delivery volume and topography increased hauling assessments, while the number of surrounding producers and the proximity to a processing plant reduced hauling assessments, holding all else constant. For this analysis, delivery distance did not have significant explanatory power for determining the hauling assessment.

Conclusion

This study determined the weighted average transportation statistics for producers associated with the Mideast Marketing Area for May 2009. Additionally, this study attempted to quantify the statistical relationship between hauling assessments and variables such as delivery volume and delivery distance among others.

The hauling assessments assessed to producers included in this analysis were approximately 5.8 million dollars for May 2009, a reduction of 4.6 percent from May 2008 assessments of 6.0 million dollars.

The weighted average hauling assessment was $4,230.05; the weighted average hauling assessment per cwt was 47.72 cents; the weighted average delivery distance was 102.7 miles; and the weighted average MRF was 1.609 cents per cwt per mile.

The data included in this analysis indicates that hauling assessments vary significantly due to multiple factors. Factors influencing hauling assessments include delivery pounds, topography, competitive groups of producers and the proximity to a processing plant. Factors influencing milk transportation but not quantified in this analysis include fuel prices, state regulations, weight restrictions, taxes, nature of milk supply and processor demand among others.

While transportation costs continue to be an important concern throughout the industry, what is apparent is that producers, cooperatives, consumers and handlers all share in the cost of moving raw milk, intermediate goods and finished products along the supply chain. Effectively managing these costs is essential in order to ensure that an adequately supply of milk is available to meet the demands of the consumer.

Possible alleviations for the high transportation costs include technological improvements in transportation, improvements in fuel efficiency, more efficient transportation routes, incentives to increase the quantity of milk being produced in deficit areas, more efficient packaging, and additional cooperation among marketing agencies when procuring farm milk

Future Publications

This analysis will be updated annually by the Mideast Market Administrator's Office using May data. For comparative purposes, May data is also used in staff papers published by the Upper Midwest and Pacific Northwest Orders.

For questions, comments or more information concerning this analysis, please contact:

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State	County	Delivery Pounds	Delivery Distance *(miles)*	Hauling Assessment *($)*	Hauling Assessment *($/cwt)*	Mileage Rate Factor *($/cwt/mile)*
Illinois						
	Carroll	784,652	20.64	122.26	0.097	0.0047
	Champaign	R	R	R	R	R
	Grundy	R	R	R	R	R
	Iroquois	774,327	127.20	1,330.24	1.094	0.0094
	Kankakee	463,946	87.04	1,664.75	0.873	0.0130
	Ogle	R	R	R	R	R
	Stephenson	3,678,249	22.00	3,768.56	0.229	0.0104
	Vermilion	R	R	R	R	R
	Will	503,723	37.70	996.25	0.856	0.0240
	Winnebago	R	R	R	R	R
Indiana						
	Adams	7,901,981	126.64	2,463.79	0.402	0.0089
	Allen	3,173,492	65.80	1,894.38	0.718	0.0742
	Bartholomew	244,203	148.34	677.71	0.667	0.0045
	Benton	R	R	R	R	R
	Boone	303,327	43.80	1,257.83	1.026	0.0234
	Carroll	R	R	R	R	R
	Cass	2,401,694	49.26	8,073.14	0.519	0.0106
	Clay	R	R	R	R	R
	Clinton	R	R	R	R	R
	Decatur	380,092	118.71	827.63	0.769	0.0087
	DeKalb	2,952,097	153.31	4,313.45	0.625	0.0076
	Delaware	578,382	28.27	1,343.52	0.633	0.0254
	Elkhart	24,750,948	42.23	1,554.14	0.580	0.0738
	Fayette	762,315	217.04	2,187.20	0.658	0.0031
	Fountain	R	R	R	R	R
	Franklin	541,044	127.33	1,823.09	0.659	0.0052
	Fulton	3,662,412	30.17	1,298.17	0.650	0.0675
	Grant	235,684	30.63	882.44	0.868	0.0283
	Hamilton	R	R	R	R	R
	Hancock	R	R	R	R	R
	Hendricks	415,652	57.11	1,780.74	1.167	0.0205
	Henry	3,944,779	101.81	7,026.29	0.312	0.0050
	Howard	520,914	47.30	801.22	1.043	0.0221
	Huntington	5,237,366	151.65	2,892.14	0.372	0.0128
	Jackson	854,000	97.16	2,050.12	0.704	0.0074
	Jasper	R	R	R	R	R

R: Restricted information.

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MIDEAST MARKETING AREA WEIGHTED AVERAGE TRANSPORTATION STATISTICS BY STATE AND COUNTY FOR MAY 2009

State	County	Delivery Pounds	Delivery Distance *(miles)*	Hauling Assessment *($)*	Hauling Assessment *($/cwt)*	Mileage Rate Factor *($/cwt/mile)*
IN (cont.)	Jay	2,035,667	55.10	1,230.36	0.522	0.0117
	Jefferson	341,715	104.31	734.00	0.478	0.0046
	Johnson	R	R	R	R	R
	Kosciusko	6,155,855	62.19	3,935.25	0.613	0.0130
	LaGrange	11,646,908	57.76	855.23	0.696	0.0166
	Lake	615,748	24.30	1,797.34	0.654	0.0270
	LaPorte	7,564,508	105.80	4,810.66	0.654	0.0070
	Madison	R	R	R	R	R
	Marshall	13,218,984	94.53	3,416.66	0.474	0.0086
	Miami	1,471,784	31.19	1,206.31	0.625	0.0207
	Montgomery	419,408	67.69	1,263.86	1.385	0.0205
	Morgan	251,709	35.03	689.23	0.949	0.0271
	Noble	6,620,264	87.80	2,270.35	0.565	0.0121
	Owen	R	R	R	R	R
	Parke	2,103,840	97.36	1,074.32	1.405	0.0147
	Porter	461,648	89.01	1,055.91	0.699	0.0135
	Pulaski	2,835,008	75.42	6,953.29	0.529	0.0114
	Randolph	2,803,293	136.39	5,191.52	0.282	0.0024
	Ripley	R	R	R	R	R
	Rush	1,044,170	93.90	1,271.77	0.682	0.0097
	Shelby	1,001,669	76.72	1,201.10	0.740	0.0116
	St. Joseph	2,556,622	60.16	1,372.70	0.500	0.0107
	Starke	R	R	R	R	R
	Steuben	4,683,660	120.66	2,421.74	0.637	0.0077
	Switzerland	R	R	R	R	R
	Tippecanoe	599,387	81.50	2,337.67	0.790	0.0109
	Tipton	R	R	R	R	R
	Union	R	R	R	R	R
	Wabash	5,210,956	224.92	6,901.08	0.366	0.0056
	Wayne	2,820,761	23.84	951.52	0.708	0.1826
	Wells	6,943,490	155.55	6,346.71	0.384	0.0088
	White	660,377	76.76	1,630.13	0.631	0.0082
	Whitley	2,603,667	30.01	3,083.52	0.763	0.0373
Kentucky						
	Boone	R	R	R	R	R
	Bracken	301,840	39.87	654.54	1.147	0.0288
	Christian	R	R	R	R	R
	Fleming	631,707	83.22	1,350.77	0.772	0.0093

R: Restricted information.

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MIDEAST MARKETING AREA WEIGHTED AVERAGE TRANSPORTATION STATISTICS BY STATE AND COUNTY FOR MAY 2009

State	County	Delivery Pounds	Delivery Distance *(miles)*	Hauling Assessment *($)*	Hauling Assessment *($/cwt)*	Mileage Rate Factor *($/cwt/mile)*
KY (cont.)	Gallatin	R	R	R	R	R
	Henry	R	R	R	R	R
	Mason	755,335	57.36	1,418.25	0.923	0.0161
	Montgomery	R	R	R	R	R
	Shelby	278,644	129.20	380.95	0.716	0.0057
	Todd	R	R	R	R	R
Maryland						
	Allegany	R	R	R	R	R
	Garrett	2,477,760	104.01	913.63	1.054	0.0180
Michigan						
	Alcona	2,039,705	182.32	2,679.39	0.722	0.0045
	Alger	436,989	42.99	1,046.17	0.800	0.0186
	Allegan	24,702,350	88.47	3,753.20	0.390	0.0072
	Alpena	6,445,836	183.73	1,950.64	0.542	0.0030
	Antrim	813,204	101.55	1,871.66	0.821	0.0081
	Arenac	6,518,308	157.30	2,769.26	0.514	0.0053
	Baraga	424,305	60.78	1,724.59	0.829	0.0136
	Barry	23,899,360	75.16	5,786.03	0.391	0.0116
	Bay	1,974,557	61.10	1,906.98	0.561	0.0093
	Berrien	5,438,707	235.48	4,873.03	0.316	0.0075
	Branch	8,299,899	98.61	5,037.11	0.349	0.0050
	Calhoun	9,634,627	87.14	9,874.86	0.528	0.0093
	Cass	345,211	26.12	442.66	0.670	0.0257
	Charlevoix	1,025,661	107.60	1,746.74	0.643	0.0060
	Cheboygan	1,053,144	163.21	2,496.81	0.853	0.0052
	Chippewa	1,089,671	232.21	1,675.76	0.898	0.0039
	Clare	2,762,164	61.52	1,027.76	0.565	0.0118
	Clinton	51,086,477	59.02	8,345.22	0.334	0.0157
	Delta	1,145,407	65.18	1,021.00	0.661	0.0101
	Dickinson	1,172,911	72.66	1,146.26	0.184	0.0025
	Eaton	3,372,325	61.06	883.68	0.483	0.0084
	Emmet	770,064	132.45	2,051.14	1.004	0.0076
	Genesee	2,277,147	18.48	1,767.33	0.547	0.1776
	Gladwin	1,375,114	79.21	1,434.40	0.574	0.0080
	Grand Traverse	489,976	73.41	579.16	0.759	0.0103
	Gratiot	38,339,794	131.06	5,392.65	0.217	0.0051

R: Restricted information.

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MIDEAST MARKETING AREA WEIGHTED AVERAGE TRANSPORTATION STATISTICS BY STATE AND COUNTY FOR MAY 2009

State	County	Delivery Pounds	Delivery Distance (miles)	Hauling Assessment ($)	Hauling Assessment ($/cwt)	Mileage Rate Factor ($/cwt/mile)
MI (cont.)	Hillsdale	11,417,521	124.74	3,326.93	0.540	0.0061
	Huron	64,142,118	172.91	8,041.60	0.323	0.0027
	Ingham	10,541,345	137.38	4,141.07	0.555	0.0084
	Ionia	24,691,992	110.53	6,232.82	0.354	0.0076
	Iosco	4,018,866	135.82	2,213.72	0.585	0.0047
	Isabella	12,663,154	48.79	3,398.74	0.479	0.0108
	Jackson	6,090,925	144.34	2,840.80	0.504	0.0056
	Kalamazoo	2,408,082	20.14	6,464.23	0.558	0.0288
	Kalkaska	R	R	R	R	R
	Kent	15,777,729	143.98	3,917.59	0.357	0.0151
	Lake	398,585	31.17	876.50	0.567	0.0182
	Lapeer	4,969,146	46.46	1,255.60	0.523	0.0151
	Leelanau	383,743	96.32	896.14	0.915	0.0099
	Lenawee	24,659,812	226.91	16,424.24	0.437	0.0022
	Livingston	5,776,549	97.57	3,717.07	0.485	0.0092
	Mackinac	1,264,275	210.26	2,194.01	0.574	0.0027
	Macomb	596,115	37.26	498.24	0.655	0.0185
	Marquette	R	R	R	R	R
	Mason	4,007,703	82.51	2,660.38	0.731	0.0089
	Mecosta	5,729,924	49.27	2,237.91	0.536	0.0132
	Menominee	4,554,770	42.85	1,474.57	0.335	0.0081
	Midland	R	R	R	R	R
	Missaukee	25,506,404	92.40	5,379.25	0.522	0.0093
	Monroe	937,828	105.71	904.93	0.352	0.0079
	Montcalm	13,533,676	97.96	2,384.35	0.478	0.0101
	Montmorency	1,227,430	134.11	1,757.88	0.691	0.0052
	Muskegon	3,943,060	80.56	2,543.20	0.471	0.0062
	Newaygo	15,585,187	38.08	3,206.37	0.527	0.0143
	Oakland	R	R	R	R	R
	Oceana	1,389,327	69.99	1,392.49	0.722	0.0103
	Ogemaw	10,801,880	165.47	2,587.89	0.529	0.0047
	Osceola	13,862,954	42.76	2,864.79	0.531	0.0603
	Oscoda	909,125	110.60	1,029.55	0.716	0.0065
	Ottawa	24,020,294	107.47	2,394.30	0.367	0.0053
	Presque Isle	1,635,539	177.82	2,135.04	0.687	0.0039
	Saginaw	4,849,495	178.88	2,145.44	0.532	0.0104
	Sanilac	38,320,614	172.66	6,190.04	0.408	0.0036
	Schoolcraft	R	R	R	R	R
	Shiawassee	5,200,312	89.05	2,006.54	0.508	0.0181
	St. Clair	2,590,948	71.58	1,321.72	0.519	0.0075

R: Restricted information.

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State	County	Delivery Pounds	Delivery Distance (miles)	Hauling Assessment ($)	Hauling Assessment ($/cwt)	Mileage Rate Factor ($/cwt/mile)
MI (cont.)	St. Joseph	10,251,974	165.54	1,406.57	0.167	0.0102
	Tuscola	12,069,491	137.49	4,951.72	0.412	0.0062
	Van Buren	3,034,813	45.01	2,871.84	0.552	0.0141
	Washtenaw	4,480,962	41.52	1,834.35	0.578	0.0228
	Wexford	1,183,650	38.85	1,713.23	0.571	0.0172
New York						
	Cattaraugus	2,763,161	61.61	2,450.70	0.574	0.0123
	Chautauqua	4,102,407	169.37	1,049.63	0.643	0.0046
	Erie	616,422	14.04	1,095.80	0.610	0.0971
	Livingston	R	R	R	R	R
	Steuben	R	R	R	R	R
	Wyoming	16,667,918	68.05	5,772.33	0.539	0.0096
Ohio						
	Adams	1,700,160	99.02	765.32	0.731	0.0075
	Allen	697,986	83.16	1,371.68	0.607	0.0074
	Ashland	9,473,923	62.20	2,904.32	0.562	0.0105
	Ashtabula	4,072,912	38.98	2,801.51	0.548	0.0157
	Athens	1,559,897	87.53	1,051.68	0.920	0.0108
	Auglaize	6,426,182	166.13	899.76	0.492	0.0086
	Belmont	1,773,700	99.29	887.57	0.817	0.0317
	Brown	180,848	90.87	662.95	0.881	0.0105
	Butler	523,784	149.42	820.82	0.757	0.0054
	Carroll	2,700,637	79.95	770.15	0.707	0.0157
	Champaign	1,937,874	40.98	1,031.07	0.551	0.0224
	Clark	6,610,653	140.40	8,601.31	0.273	0.0050
	Clermont	R	R	R	R	R
	Clinton	270,844	68.88	728.40	0.741	0.0130
	Columbiana	11,395,542	63.61	1,779.05	0.631	0.0125
	Coshocton	2,384,296	44.08	890.35	0.643	0.0154
	Crawford	1,289,926	77.93	2,095.70	0.678	0.0091
	Darke	9,637,824	46.54	1,537.64	0.481	0.0129
	Defiance	7,315,037	136.36	13,377.42	0.470	0.0041
	Delaware	423,308	38.49	538.97	0.646	0.0168
	Fairfield	1,057,358	37.28	797.17	0.641	0.0211
	Fayette	R	R	R	R	R
	Franklin	R	R	R	R	R

R: Restricted information.

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MIDEAST MARKETING AREA WEIGHTED AVERAGE TRANSPORTATION STATISTICS BY STATE AND COUNTY FOR MAY 2009

State	County	Delivery Pounds	Delivery Distance (miles)	Hauling Assessment ($)	Hauling Assessment ($/cwt)	Mileage Rate Factor ($/cwt/mile)
OH (cont.)	Fulton	3,833,539	183.55	6,244.42	0.600	0.0042
	Gallia	888,387	79.19	1,561.26	0.800	0.0117
	Geauga	1,861,970	27.41	1,372.51	0.648	0.0382
	Greene	374,833	74.64	625.91	0.680	0.0106
	Guernsey	741,759	62.26	1,006.10	0.700	0.0152
	Hamilton	R	R	R	R	R
	Hancock	981,203	134.48	2,374.26	0.574	0.0045
	Hardin	10,475,322	193.20	16,554.71	0.312	0.0020
	Harrison	988,117	124.12	846.65	0.770	0.0132
	Henry	3,733,094	147.49	2,623.89	0.310	0.0048
	Highland	1,014,273	76.61	944.41	0.736	0.0110
	Holmes	12,056,381	21.10	1,528.59	0.536	0.0460
	Huron	3,665,480	67.95	980.88	0.798	0.0119
	Jackson	108,753	88.14	541.04	1.117	0.0127
	Jefferson	1,169,711	60.94	1,038.18	0.842	0.0293
	Knox	5,134,734	74.70	2,117.70	0.642	0.0153
	Lawrence	R	R	R	R	R
	Licking	2,276,779	40.88	1,207.64	0.604	0.0939
	Logan	4,520,521	113.62	1,361.04	0.508	0.0085
	Lorain	210,972	61.39	784.33	0.812	0.0132
	Madison	9,274,634	141.60	8,871.42	0.297	0.0030
	Mahoning	7,832,575	55.13	3,808.00	0.511	0.0111
	Marion	6,206,761	274.63	19,710.23	0.486	0.0029
	Medina	2,996,201	151.68	1,857.75	0.527	0.0058
	Meigs	1,059,429	93.75	2,049.38	0.853	0.0094
	Mercer	30,447,654	59.24	1,792.70	0.415	0.0108
	Miami	1,737,876	58.70	1,017.32	0.559	0.0168
	Monroe	1,356,723	78.19	893.63	0.819	0.0124
	Montgomery	367,490	97.08	493.29	0.620	0.0073
	Morgan	745,023	67.87	1,240.00	0.648	0.0095
	Morrow	2,833,091	64.19	3,291.78	0.800	0.0125
	Muskingum	868,432	43.55	835.75	0.747	0.0179
	Paulding	10,779,261	126.51	10,405.21	0.271	0.0032
	Perry	R	R	R	R	R
	Pickaway	2,284,485	128.27	5,367.14	0.406	0.0040
	Pike	1,060,744	140.91	1,748.18	0.888	0.0073
	Portage	2,067,577	29.87	1,742.69	0.511	0.0173
	Preble	1,509,451	77.16	1,163.39	0.670	0.0145
	Putnam	6,138,507	120.79	4,331.76	0.270	0.0028
	Richland	9,223,735	54.64	1,196.99	0.796	0.0160

R: Restricted information.

(continued on the following page)

APPENDIX A

MIDEAST MARKETING AREA WEIGHTED AVERAGE TRANSPORTATION STATISTICS BY STATE AND COUNTY FOR MAY 2009

State	County	Delivery Pounds	Delivery Distance (miles)	Hauling Assessment ($)	Hauling Assessment ($/cwt)	Mileage Rate Factor ($/cwt/mile)
OH (cont.)	Ross	220,362	83.41	539.51	0.832	0.0112
	Sandusky	R	R	R	R	R
	Scioto	234,958	106.90	1,186.46	0.719	0.0067
	Seneca	473,561	88.03	1,273.44	0.799	0.0091
	Shelby	11,488,785	195.96	3,283.59	0.438	0.0079
	Stark	15,604,568	26.30	2,076.56	0.505	0.0704
	Summit	R	R	R	R	R
	Trumbull	2,403,896	21.63	1,686.75	0.662	0.0305
	Tuscarawas	9,380,404	30.23	2,091.78	0.578	0.0218
	Union	1,238,379	59.86	922.19	0.575	0.0107
	Van Wert	3,055,396	95.98	1,907.66	0.308	0.0033
	Warren	R	R	R	R	R
	Washington	4,758,967	99.48	2,147.10	0.526	0.0053
	Wayne	37,456,848	48.87	1,528.23	0.453	0.0198
	Williams	5,050,120	82.05	7,339.40	0.261	0.0033
	Wood	R	R	R	R	R
	Wyandot	90,025	77.48	268.08	0.804	0.0104
Pennsylvania						
	Adams	R	R	R	R	R
	Allegheny	R	R	R	R	R
	Armstrong	2,760,566	169.49	1,938.45	0.787	0.0067
	Beaver	1,118,287	92.12	813.03	0.784	0.0099
	Bedford	R	R	R	R	R
	Blair	R	R	R	R	R
	Butler	1,416,804	153.56	1,004.58	0.853	0.0081
	Cambria	345,974	214.63	1,061.68	0.856	0.0040
	Cameron	R	R	R	R	R
	Centre	2,416,732	121.27	1,270.57	0.850	0.0084
	Clarion	2,213,050	144.05	1,690.45	0.795	0.0077
	Clearfield	1,237,732	175.86	1,331.70	1.007	0.0061
	Clinton	1,494,885	128.81	707.39	0.802	0.0066
	Crawford	7,153,830	92.10	2,146.24	0.686	0.0091
	Elk	616,896	226.68	891.78	1.037	0.0046
	Erie	4,642,842	119.28	1,747.67	0.730	0.0207
	Fayette	2,389,692	115.42	1,417.85	0.790	0.2469
	Forest	R	R	R	R	R
	Greene	471,103	127.35	1,192.35	0.864	0.0199
	Huntingdon	939,635	82.78	4,797.75	0.821	0.0102

R: Restricted information.

(continued on the following page)

APPENDIX A

MIDEAST MARKETING AREA WEIGHTED AVERAGE TRANSPORTATION STATISTICS BY STATE AND COUNTY FOR MAY 2009

State	County	Delivery Pounds	Delivery Distance *(miles)*	Hauling Assessment *($)*	Hauling Assessment *($/cwt)*	Mileage Rate Factor *($/cwt/mile)*
PA (cont.)	Indiana	4,055,850	143.77	1,684.05	0.924	0.0082
	Jefferson	1,529,604	139.52	1,255.53	0.948	0.0075
	Juniata	R	R	R	R	R
	Lawrence	3,237,501	135.15	1,037.31	0.724	0.0078
	Lycoming	R	R	R	R	R
	McKean	R	R	R	R	R
	Mercer	4,293,959	87.19	1,295.96	0.641	0.0349
	Schuylkill	399,715	52.33	897.12	0.900	0.0172
	Somerset	8,369,238	149.07	2,158.89	0.816	0.0106
	Venango	783,216	128.45	1,725.72	0.778	0.0123
	Warren	844,806	142.24	2,026.66	0.643	0.0046
	Washington	2,029,299	145.04	1,603.20	0.918	0.0166
	Westmoreland	4,727,289	128.43	1,537.56	0.895	0.0106
West Virginia						
	Barbour	137,913	129.93	692.50	1.232	0.0095
	Brooke	R	R	R	R	R
	Grant	R	R	R	R	R
	Greenbrier	R	R	R	R	R
	Hardy	R	R	R	R	R
	Harrison	R	R	R	R	R
	Jackson	414,474	65.74	1,502.79	0.841	0.0165
	Marshall	112,893	13.70	367.76	0.907	0.0662
	Mason	1,501,955	107.18	1,097.01	0.681	0.0071
	Monongalia	238,835	155.48	655.08	0.740	0.0048
	Ohio	459,143	178.50	606.84	0.973	0.1362
	Preston	1,402,892	218.68	1,597.86	0.746	0.0075
	Randolph	R	R	R	R	R
	Roane	R	R	R	R	R
	Taylor	94,168	138.58	485.52	1.429	0.0103
	Wetzel	R	R	R	R	R
	Wirt	R	R	R	R	R
	Wood	R	R	R	R	R
Wisconsin						
	Brown	R	R	R	R	R
	Calumet	250,821	26.69	172.43	0.199	0.0075
	Clark	708,148	44.27	167.44	0.160	0.0038

R: Restricted information.

(continued on the following page)

APPENDIX A

MIDEAST MARKETING AREA WEIGHTED AVERAGE TRANSPORTATION STATISTICS BY STATE AND COUNTY FOR MAY 2009

State	County	Delivery Pounds	Delivery Distance (miles)	Hauling Assessment ($)	Hauling Assessment ($/cwt)	Mileage Rate Factor ($/cwt/mile)
WI (cont.)	Columbia	R	R	R	R	R
	Crawford	R	R	R	R	R
	Dane	7,264,561	64.65	176.46	0.119	0.0019
	Dodge	897,060	75.53	250.19	0.234	0.0034
	Florence	R	R	R	R	R
	Green	R	R	R	R	R
	Iowa	1,761,426	45.83	139.97	0.087	0.0020
	Jefferson	R	R	R	R	R
	Juneau	2,418,557	31.57	309.81	0.162	0.0051
	Langlade	471,435	63.39	223.37	0.134	0.0021
	Lincoln	R	R	R	R	R
	Manitowoc	205,757	187.16	152.21	0.224	0.0012
	Marathon	532,396	37.30	152.63	0.259	0.0069
	Marinette	2,125,752	37.13	1,599.11	0.154	0.0045
	Oconto	327,618	53.63	143.16	0.260	0.0051
	Outagamie	1,977,848	6.19	314.67	0.125	0.0823
	Portage	494,703	43.81	155.44	0.251	0.0058
	Richland	1,840,995	1.02	233.00	0.140	0.1377
	Sauk	7,433,160	30.87	274.59	0.139	0.2516
	Shawano	1,042,882	53.68	377.48	0.146	0.0030
	Vernon	R	R	R	R	R
	Washington	R	R	R	R	R
	Waupaca	2,175,839	22.98	212.60	0.170	0.0104
	Winnebago	592,206	22.81	255.24	0.121	0.0054
	Wood	1,179,786	30.50	190.35	0.158	0.0052

R: Restricted information.

APPENDIX B

Subgroup	Delivery Pounds	Average Delivery Pounds	Hauling Assessment ($)	Hauling Assessment ($/cwt)	Delivery Distance (miles)	Mileage Rate Factor ($/cwt/mile)
Illinois						
less than 60,000	368,500	33,500	422.26	1.147	80.69	0.0187
60,000 to 90,000	656,114	72,902	295.43	0.439	49.58	0.0076
90,000 to 125,000	425,764	106,441	559.12	0.528	70.71	0.0083
125,000 to 190,000	1,375,520	152,836	738.10	0.486	63.40	0.0065
190,000 to 250,000	R	R	R	R	R	R
250,000 to 500,000	1,579,373	315,875	523.99	0.194	28.26	0.0049
1 million to 2 million	R	R	R	R	R	R
Indiana						
less than 60,000	15,835,079	38,717	383.99	0.792	72.66	0.0381
60,000 to 90,000	12,579,159	71,069	568.49	0.780	59.58	0.0426
90,000 to 125,000	10,882,103	104,636	769.05	0.728	51.98	0.0545
125,000 to 190,000	15,032,028	144,539	983.99	0.657	61.18	0.0296
190,000 to 250,000	12,237,318	210,988	1,355.02	0.626	55.69	0.0303
250,000 to 500,000	24,557,087	341,071	2,015.69	0.564	57.68	0.0422
500,000 to 1 million	16,305,017	652,201	3,921.83	0.576	82.90	0.0179
1 million to 2 million	26,540,535	1,474,474	6,195.60	0.410	126.12	0.0075
more than 2 million	15,722,574	3,144,515	7,675.49	0.233	191.13	0.0014
Kentucky						
less than 60,000	766,500	36,500	355.49	0.894	100.15	0.0135
60,000 to 90,000	495,760	82,627	730.96	0.880	68.31	0.0159
90,000 to 125,000	344,056	114,685	879.51	0.764	134.02	0.0064
125,000 to 190,000	R	R	R	R	R	R
190,000 to 250,000	R	R	R	R	R	R
250,000 to 500,000	R	R	R	R	R	R
Maryland						
less than 60,000	1,050,042	42,002	543.88	1.199	99.75	0.0202
60,000 to 90,000	456,136	76,023	918.81	1.192	68.42	0.0227
90,000 to 125,000	445,040	111,260	1,070.17	0.954	98.48	0.0168
125,000 to 190,000	R	R	R	R	R	R
190,000 to 250,000	R	R	R	R	R	R
Michigan						
less than 60,000	19,168,739	35,302	280.52	0.704	85.23	0.0193
60,000 to 90,000	16,553,012	77,351	445.71	0.572	81.44	0.0147
90,000 to 125,000	21,391,387	110,265	623.83	0.564	76.84	0.0164
125,000 to 190,000	35,230,665	164,629	910.37	0.540	96.03	0.0123
190,000 to 250,000	33,603,703	227,052	1,203.99	0.524	82.83	0.0138
250,000 to 500,000	100,645,579	372,761	1,995.86	0.512	90.70	0.0145
500,000 to 1 million	95,252,755	721,612	3,448.15	0.458	89.85	0.0127
1 million to 2 million	87,588,820	1,435,882	5,875.34	0.398	127.89	0.0080
more than 2 million	188,923,900	3,855,590	10,826.03	0.260	160.58	0.0040

R: Restricted information not included.

(continued on the following page)

APPENDIX B

Subgroup	Delivery Pounds	Average Delivery Pounds	Hauling Assessment ($)	Hauling Assessment ($/cwt)	Delivery Distance (miles)	Mileage Rate Factor ($/cwt/mile)
New York						
less than 60,000	903,584	39,286	321.16	0.738	127.41	0.0139
60,000 to 90,000	999,225	76,863	498.99	0.642	118.29	0.0166
90,000 to 125,000	1,173,433	106,676	675.32	0.626	114.37	0.0073
125,000 to 190,000	909,752	151,625	958.98	0.627	96.88	0.0240
190,000 to 250,000	1,505,415	215,059	1,257.29	0.577	138.16	0.0063
250,000 to 500,000	4,224,765	384,070	2,296.20	0.583	80.85	0.0195
500,000 to 1 million	7,277,701	727,770	4,188.94	0.541	81.65	0.0092
1 million to 2 million	5,899,144	1,179,829	6,299.57	0.529	55.93	0.0102
more than 2 million	R	R	R	R	R	R
Ohio						
less than 60,000	19,904,684	38,205	366.32	0.772	60.20	0.0254
60,000 to 90,000	19,953,948	75,583	516.84	0.662	60.88	0.0218
90,000 to 125,000	27,806,491	108,196	726.00	0.654	59.21	0.0219
125,000 to 190,000	39,379,255	157,517	975.86	0.586	71.46	0.0209
190,000 to 250,000	28,844,576	220,188	1,238.54	0.552	71.87	0.0219
250,000 to 500,000	56,354,875	335,446	1,851.33	0.531	63.08	0.0192
500,000 to 1 million	40,030,622	678,485	2,972.47	0.426	61.72	0.0178
1 million to 2 million	29,225,258	1,328,421	4,961.22	0.362	88.25	0.0074
more than 2 million	59,770,921	3,984,728	12,417.93	0.277	174.51	0.0018
Pennsylvania						
less than 60,000	10,140,473	36,477	396.10	0.988	139.31	0.0273
60,000 to 90,000	11,032,177	72,106	627.49	0.864	136.29	0.0110
90,000 to 125,000	6,554,713	105,721	876.59	0.822	121.48	0.0274
125,000 to 190,000	9,475,984	150,412	1,160.62	0.761	135.04	0.0242
190,000 to 250,000	5,915,947	211,284	1,635.87	0.770	111.89	0.0462
250,000 to 500,000	10,670,426	344,207	2,674.52	0.750	123.74	0.0143
500,000 to 1 million	4,431,776	738,629	4,416.27	0.584	118.66	0.0102
1 million to 2 million	R	R	R	R	R	R
West Virginia						
less than 60,000	1,398,033	39,944	598.63	0.986	143.75	0.0360
60,000 to 90,000	621,435	69,048	645.80	0.929	87.60	0.0572
90,000 to 125,000	513,649	102,730	791.78	0.770	169.35	0.0051
125,000 to 190,000	1,052,167	150,310	1,142.90	0.762	146.24	0.0089
190,000 to 250,000	891,439	222,860	1,820.90	0.812	107.73	0.0077
250,000 to 500,000	1,566,051	313,210	2,126.47	0.670	172.96	0.0062

R: Restricted information not included.

(continued on the following page)

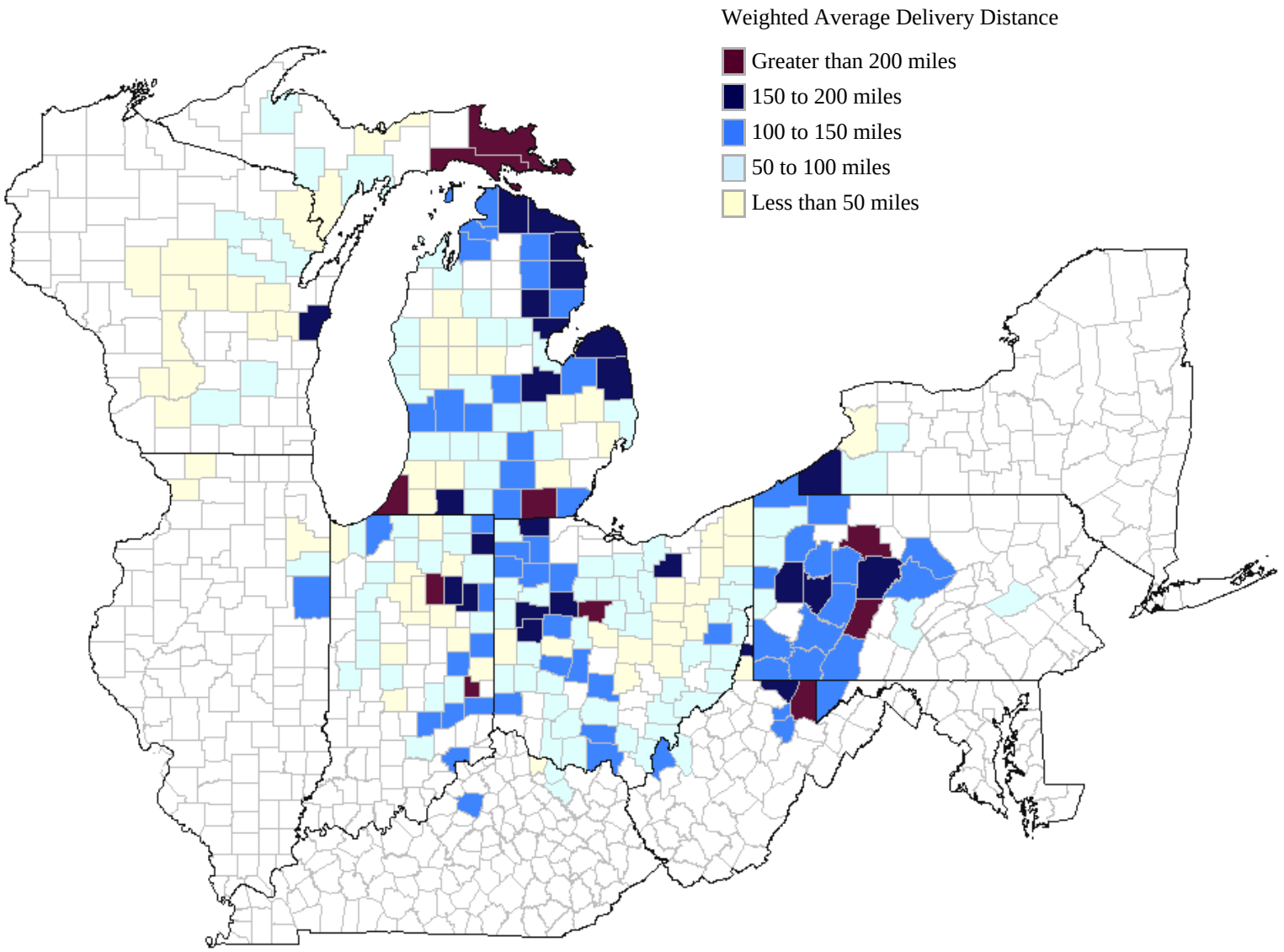
APPENDIX B

Subgroup	Delivery Pounds	Average Delivery Pounds	Hauling Assessment *($)*	Hauling Assessment *($/cwt)*	Delivery Distance *(miles)*	Mileage Rate Factor *($/cwt/mile)*
Wisconsin						
less than 60,000	2,367,278	38,808	158.23	0.397	46.87	0.1762
60,000 to 90,000	3,495,164	69,903	163.40	0.230	40.55	0.0622
90,000 to 125,000	5,129,754	109,144	179.51	0.158	37.43	0.0938
125,000 to 190,000	7,160,159	149,170	200.07	0.131	39.23	0.0702
190,000 to 250,000	4,914,192	213,661	240.22	0.111	40.69	0.0255
250,000 to 500,000	7,484,064	311,836	298.28	0.088	36.71	0.0352
500,000 to 1 million	4,178,806	596,972	397.65	0.068	44.61	0.0891
1 million to 2 million	R	R	R	R	R	R

R: Restricted information not included.

APPENDIX C

WEIGHTED AVERAGE DELIVERY DISTANCE BY STATE AND COUNTY FOR MAY 2009 1/



1/ Restricted information not included.

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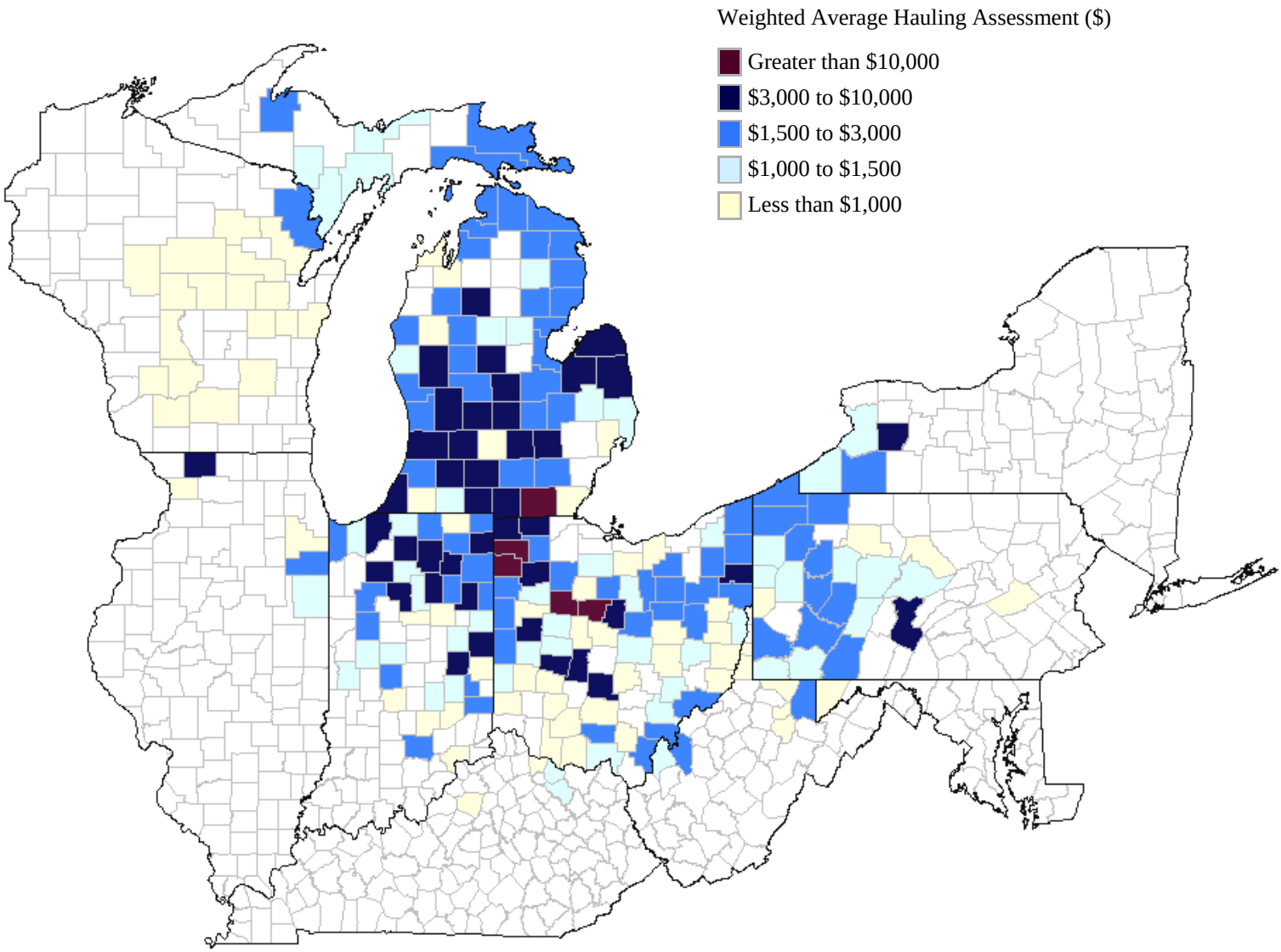
APPENDIX C

WEIGHTED AVERAGE HAULING ASSESSMENT BY STATE AND COUNTY FOR MAY 2009 1/

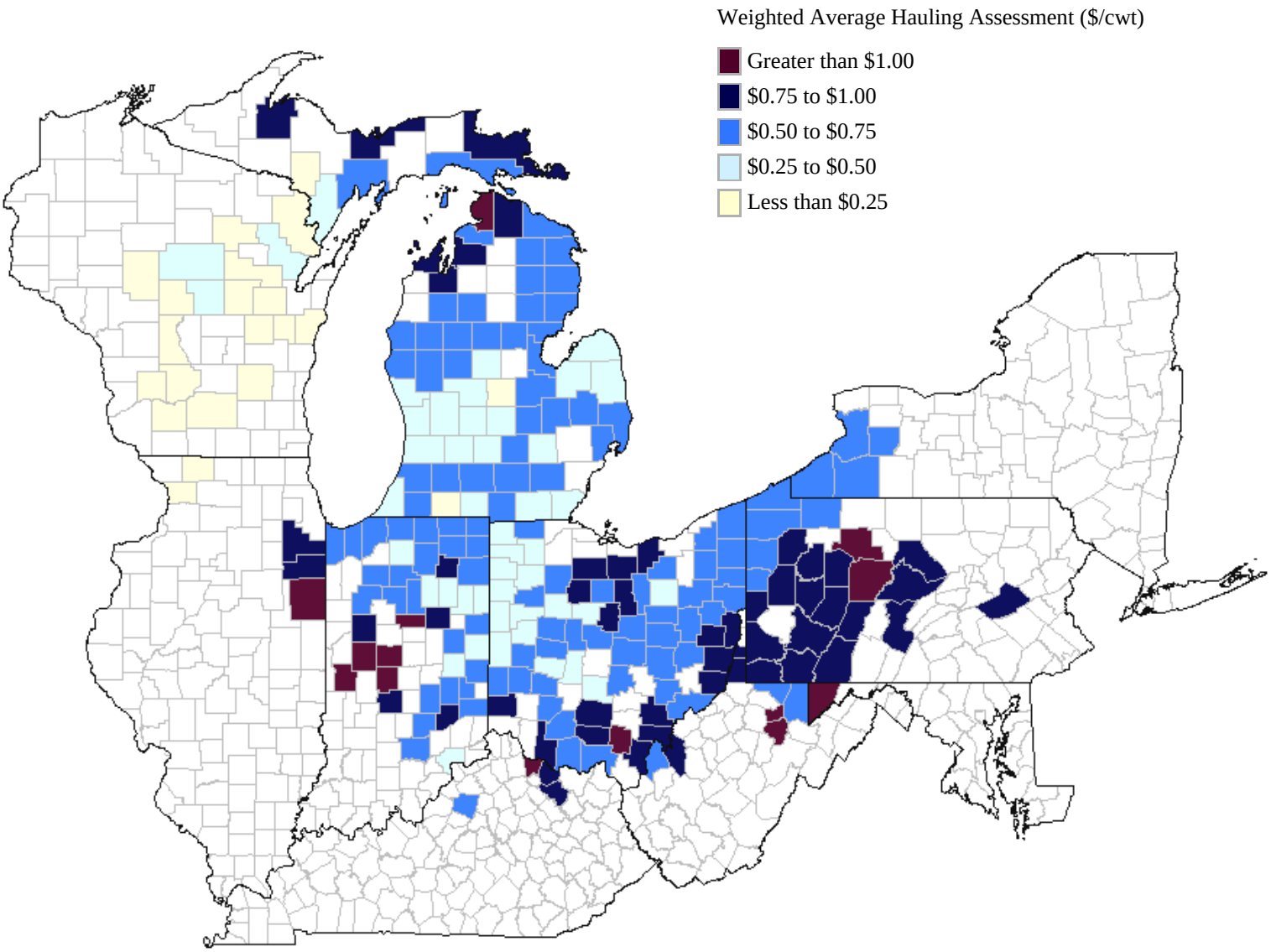


1/ Restricted information not included.

(continued on the following page)

APPENDIX C

WEIGHTED AVERAGE HAULING ASSESSMENT PER CWT BY STATE AND COUNTY FOR MAY 2009 1/



1/ Restricted information not included.

APPENDIX D
Model Output

Dependent Variable: HA
Method: Least Squares
Date: 09/16/09 Time: 13:54
Sample: 1 5633
Included observations: 5633
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	480.5854	40.49187	11.86869	0.0000
P	0.002798	0.000205	13.63684	0.0000
M	0.098338	0.138367	0.710703	0.4773
CL	-0.834806	0.114967	-7.261247	0.0000

R-squared	0.724400	Mean dependent var	1024.388
Adjusted R-squared	0.724253	S.D. dependent var	1603.542
S.E. of regression	842.0464	Akaike info criterion	16.31026
Sum squared resid	3.99E+09	Schwarz criterion	16.31497
Log likelihood	-45933.84	Hannan-Quinn criter.	16.31190
F-statistic	4931.832	Durbin-Watson stat	1.750405
Prob(F-statistic)	0.000000		

Dependent Variable: HA
Method: Least Squares
Date: 09/16/09 Time: 13:56
Sample: 1 5633
Included observations: 5633
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	231.4984	27.05725	8.555873	0.0000
P	0.004428	0.000179	24.72552	0.0000
P^2	-3.78E-10	6.68E-11	-5.660387	0.0000
M	0.201298	0.125548	1.603356	0.1089
CL	-0.744129	0.104271	-7.136513	0.0000

R-squared	0.794423	Mean dependent var	1024.388
Adjusted R-squared	0.794277	S.D. dependent var	1603.542
S.E. of regression	727.3141	Akaike info criterion	16.01748
Sum squared resid	2.98E+09	Schwarz criterion	16.02337
Log likelihood	-45108.24	Hannan-Quinn criter.	16.01953
F-statistic	5437.148	Durbin-Watson stat	1.766031
Prob(F-statistic)	0.000000		

APPENDIX D
Model Output

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/10/09 Time: 14:36
Sample: 1 5633
Included observations: 5633
Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1388651.	596723.0	-2.327128	0.0200
P	13.95825	1.323113	10.54956	0.0000
P^2	-1.33E-05	6.99E-07	-19.04249	0.0000
P*(P^2)	4.10E-12	1.66E-13	24.68808	0.0000
P*M	-0.040044	0.003559	-11.25026	0.0000
P*CL	0.056116	0.007372	7.612130	0.0000
P*T	-3.111744	1.159769	-2.683073	0.0073
P*U10	-6.920188	1.089105	-6.354016	0.0000
P*U50	-4.876895	0.957283	-5.094519	0.0000
(P^2)^2	-3.80E-19	1.24E-20	-30.66819	0.0000
(P^2)*M	1.85E-08	7.66E-10	24.13350	0.0000
(P^2)*CL	-2.60E-08	1.69E-09	-15.34156	0.0000
(P^2)*T	1.22E-06	5.56E-07	2.188727	0.0287
(P^2)*U10	2.62E-06	2.18E-07	11.99767	0.0000
(P^2)*U50	2.50E-06	1.73E-07	14.48869	0.0000
M	8845.207	4474.927	1.976615	0.0481
M^2	-15.52379	7.566319	-2.051696	0.0402
M*CL	-12.48566	19.31767	-0.646334	0.5181
M*T	-5922.720	2113.417	-2.802438	0.0051
M*U10	5237.422	3419.828	1.531487	0.1257
M*U50	5708.809	2604.836	2.191620	0.0284
CL	-9436.785	6083.754	-1.551145	0.1209
CL^2	26.21483	21.91213	1.196362	0.2316
CL*T	-4878.977	2769.663	-1.761578	0.0782
CL*U10	-3372.550	5169.871	-0.652347	0.5142
CL*U50	1367.179	4493.571	0.304252	0.7609
T	1204635.	529869.0	2.273458	0.0230
T*U10	-420285.1	582511.3	-0.721506	0.4706
T*U50	-210962.1	498975.7	-0.422790	0.6725
U10	898582.5	626524.2	1.434234	0.1516
U50	112369.4	532249.0	0.211122	0.8328

R-squared	0.568618	Mean dependent var	521940.0
Adjusted R-squared	0.565921	S.D. dependent var	7495300.
S.E. of regression	4938255.	Akaike info criterion	33.66752
Sum squared resid	1.36E+17	Schwarz criterion	33.70404
Log likelihood	-94793.56	Hannan-Quinn criter.	33.68024
F-statistic	245.9196	Durbin-Watson stat	1.884233
Prob(F-statistic)	0.000000		

APPENDIX D
Model Output

Dependent Variable: HA
Method: Least Squares
Date: 09/16/09 Time: 13:52
Sample: 1 5633
Included observations: 5633
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	345.8918	42.25008	8.186772	0.0000
P	0.004435	0.000178	24.87649	0.0000
P^2	-3.79E-10	6.65E-11	-5.693010	0.0000
M	0.001036	0.140558	0.007369	0.9941
CL	-0.707852	0.105386	-6.716784	0.0000
U10	-195.4305	35.23528	-5.546445	0.0000
U50	-95.72763	31.05040	-3.082976	0.0021

R-squared	0.795554	Mean dependent var	1024.388
Adjusted R-squared	0.795336	S.D. dependent var	1603.542
S.E. of regression	725.4388	Akaike info criterion	16.01267
Sum squared resid	2.96E+09	Schwarz criterion	16.02092
Log likelihood	-45092.69	Hannan-Quinn criter.	16.01555
F-statistic	3648.720	Durbin-Watson stat	1.768681
Prob(F-statistic)	0.000000		

Dependent Variable: HA
Method: Least Squares
Date: 09/16/09 Time: 13:54
Sample: 1 5633
Included observations: 5633
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	192.9485	28.94659	6.665671	0.0000
P	0.004458	0.000180	24.74579	0.0000
P^2	-3.81E-10	6.69E-11	-5.697499	0.0000
M	0.103322	0.182620	0.565775	0.5716
CL	-0.740750	0.106475	-6.957009	0.0000
T	113.5142	19.01423	5.969960	0.0000
M*T	0.146588	0.202823	0.722740	0.4699

R-squared	0.795755	Mean dependent var	1024.388
Adjusted R-squared	0.795537	S.D. dependent var	1603.542
S.E. of regression	725.0828	Akaike info criterion	16.01169
Sum squared resid	2.96E+09	Schwarz criterion	16.01994
Log likelihood	-45089.93	Hannan-Quinn criter.	16.01456
F-statistic	3653.224	Durbin-Watson stat	1.766123
Prob(F-statistic)	0.000000		

APPENDIX D
Model Output

Dependent Variable: HA
Method: Least Squares
Date: 09/16/09 Time: 13:36
Sample: 1 5633
Included observations: 5633
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	320.4026	45.23756	7.082667	0.0000
P	0.004468	0.000179	24.91695	0.0000
P^2	-3.82E-10	6.67E-11	-5.734536	0.0000
M	-0.167511	0.204091	-0.820767	0.4118
M*T	0.302792	0.212161	1.427185	0.1536
T	105.7550	19.20563	5.506461	0.0000
CL	-0.690689	0.108465	-6.367843	0.0000
U10	-209.7685	36.18125	-5.797715	0.0000
U50	-107.5780	32.08527	-3.352877	0.0008

R-squared	0.797028	Mean dependent var	1024.388
Adjusted R-squared	0.796739	S.D. dependent var	1603.542
S.E. of regression	722.9489	Akaike info criterion	16.00615
Sum squared resid	2.94E+09	Schwarz criterion	16.01675
Log likelihood	-45072.32	Hannan-Quinn criter.	16.00984
F-statistic	2760.524	Durbin-Watson stat	1.769286
Prob(F-statistic)	0.000000		

Dependent Variable: HA
Method: Least Squares
Date: 09/16/09 Time: 14:37
Sample: 1 5633
Included observations: 5633
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	303.1780	33.49239	9.052147	0.0000
P	0.004464	0.000179	24.92114	0.0000
P^2	-3.82E-10	6.66E-11	-5.735769	0.0000
T	129.9948	11.72463	11.08733	0.0000
CL	-0.708969	0.107364	-6.603416	0.0000
U10	-200.5206	31.67689	-6.330187	0.0000
U50	-100.7714	27.19818	-3.705078	0.0002

R-squared	0.796972	Mean dependent var	1024.388
Adjusted R-squared	0.796756	S.D. dependent var	1603.542
S.E. of regression	722.9184	Akaike info criterion	16.00571
Sum squared resid	2.94E+09	Schwarz criterion	16.01396
Log likelihood	-45073.09	Hannan-Quinn criter.	16.00858
F-statistic	3680.755	Durbin-Watson stat	1.770358
Prob(F-statistic)	0.000000		