

## School Food Service Costs: Does Location Matter?

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## **School Food Service Costs: Does Location Matter?**

- Over 30 million lunches and 9.8 million breakfasts are served every day to children in schools participating in the USDA National School Lunch and School Breakfast Program (NSLP).
- School food authorities (SFAs) preparing and serving meals must provide appealing, healthful meals within the USDA reimbursement rates.
- All lunches and breakfasts are reimbursed at the same rate for each nationally representative cost of a meal.
- Yet, different regions of the country incur different costs for the same meals because the cost of living varies from location to location.
- Do costs differ across different locations?

### **Previous research has not focused on cost differences across locations.**

- The School Lunch and Breakfast Cost Study (SLBCS-II) for the 2005-2006 school year used cost accounting methods to estimate the full cost of an average lunch as \$2.79 and the estimated full costs of an average breakfast as \$1.81
- Bartlett, Glanz, and Logan (2008) found small cost differences due to some characteristics but not by location when they econometrically examined meal costs. Their results depended on several strong assumptions:
  - Assumed breakfasts are a fixed fraction of lunch costs
  - Assumed that the costs of NSLP meals are independent of the costs of non-NSLP meals (a'la carte foods). Yet, both use the same food, labor, and facilities.
  - Assumed that meal quality did not vary across SFAs.
- US GAO (2003) studied costs over time, but had no meaningful results
- Wagner (2007) examined the effect of meal quality and indirect costs on meal costs.

## **How This Study Differs From Others.**

- Uses a translog cost function to isolate cost differences due to location and SFA characteristics.
- No assumptions are made about relative lunch and breakfast costs.
- No assumptions are made about the independence of the costs of NSLP and non-NSLP meals.
- A measure of meal quality is included in the model.

## **The Data**

- Nationally representative sample of 1,665 SFAs stratified by Food Nutrition Service region from surveys conducted in 2004 for the 2002-03 school-year.
- Mathematica Policy Research (MPR) conducted the survey using telephone interviews, fax-back forms, and a self-administered cost and revenue questionnaires.
- General demographic and school information from the National Center for Educational Statistics Common Core Data CCD (NCES, 2004) and from U.S. Census Bureau data.

## **Cost Function Model**

- Three-factor (labor, food, and supply price) single product, variable translog cost function was used together with factor demand equations in a seemingly unrelated regression (SUR) to estimate costs.

-Breakfasts and lunches treated as a common type of meal because many SFAs serve no or very few breakfasts.

-Characteristics used to distinguish types of meals and kinds of SFAs.

-Capital is not included in the model because SFAs regard themselves as service organizations to a school district that incurs all fixed capital costs. Some SFAs do report rental fees but not maintenance and other recurring capital costs.

- The following general model was used:

$$C = C(\mathbf{P}, M, \mathbf{R}, \mathbf{U}, \mathbf{X})$$

where

- $C$  is labor plus food plus supply costs.
- $\mathbf{P}$  is a vector of labor, food, and supply input prices.

-Labor price is the average wage based on SFA-reported wage rates for kitchen workers, supervisors, and cooks times their respective shares of the labor pool and adjusted for fringe benefits.

-Food price equals purchased food plus value of USDA commodities divided by number of meals.

-Price of supplies equals purchased supplies divided by number of meals.

- $M$  is the number of NSLP meals served during the school year.
- $\mathbf{R}$  is a vector of dummy variables for each Food Nutrition Service region. The Southeast region is suppressed and used as the reference region. Other regions are Mid-Atlantic, Midwest, Mountain, Northeast, Southeast, Southwest, and West.
- $\mathbf{U}$  is the type of urban area (urban, suburban, and rural). Urban is suppressed and is the reference area.

■  $X$  is a vector of characteristics including a measure of meal value, dummy variables for share of high school students (controls for meal size), share of breakfasts, and value of a' la carte foods (full price foods served apart from school meal), and dummy variables for whether the SFA provides health insurance, contracts with a Service Management Company, or serves free meals to all students.

### **Choosing the Best Model**

- Gallant-Jorgenson likelihood test used to select “best model”
  - All selected variables significant to model fit
  - Use of a central kitchen for preparing meals, menu planning system, and other variables tested but rejected.

### **Model Results: Interpretation (tabular results)**

- $P_{LAB}$ ,  $P_{FOOD}$ ,  $P_{SUPPLY}$ .- Coefficients indicate the share of total costs made up of that input for the Southeast (the reference region). The sum of the coefficients equal one.
- Meals – Coefficient indicates economies of scale at the sample mean in the Southeast (the reference region). Values less than one indicate increasing returns to scale and values greater than one mean decreasing returns to scale.
- $C_{SUBURB}$  and  $C_{RURAL}$  – Coefficients indicate differences in cost per meal between urban areas of the Southeast (the reference urban area and region) and suburban and rural areas of the Southeast.
- $C_{ATLANTIC}$ ,  $C_{MIDWEST}$ ,  $C_{MOUNTAIN}$ ,  $C_{NORTHEAST}$ ,  $C_{SOUTHWEST}$ ,  $C_{WEST}$  – Each column of coefficients indicate changes from the Southeast (the reference region).

### **Model Results: Model Performance**

- Estimated cost per meal falls between the average cost per meal per SFA for each region and the weighted average cost per meal per SFA for each region for all regions except the mountain region.
- Results (see table) indicate that at sample mean input prices and all dummy variables equal zero, the labor share of cost ranges from 35.6 to 32.0 percent of costs across regions. Labor cost share rise by about 6 percent if SFAs provide health insurance and serve a' la carte foods.

- The tabular results indicate that at sample mean input prices and all dummy variables equal zero, the food share of cost ranges from 60.5 to 64.2 percent of costs across regions, but drops by about 9 percent if SFAs provide health insurance and serve a la carte foods.

### **Model Results: Model Simulations**

- Figure 2 shows that Southeast, Southwest, and urban locations serve lower cost meals relative to the national average and Mid-Atlantic, Midwestern, Northeastern, and Western suburban locations serve higher cost meals.

- Figure 3 shows that food-related cost differences vary from about \$0.38 per meal below the national average for Southwest, urban SFAs to about \$0.35 per meal above the national average for Mid-Atlantic, suburban SFAs.

- Figure 4 shows that urban Mid-Atlantic, Midwest, and Western locations have relatively high labor costs. There is about a \$0.50 difference in costs between high cost suburban West SFAs and low cost rural, Southwest SFAs.

- Figure 5 shows that all urban and all Southeast and Southwest SFAs have lower costs of characteristics. Many of the urban differences are due to larger SFA sizes. There is a \$0.67 change in costs between low cost urban, Southwest SFAs and high cost rural, Northeast SFAs. Characteristics include differences due to size, breakfast's service, provision of health care, a la carte food service, and other "X" variables included in the model

### **Conclusion**

- The cost per meal varies substantially across SFAs in different regions of the country. SFAs in the Southwest and Southeast have the lowest costs and suburban areas in the Mid-Atlantic, Midwest, Northeast, and West have the highest costs.

- Food and characteristics each account for about one-third and labor about 25 percent of the cost differences.

### Translog Cost Function Estimates for School Meals, School Year 2002-03

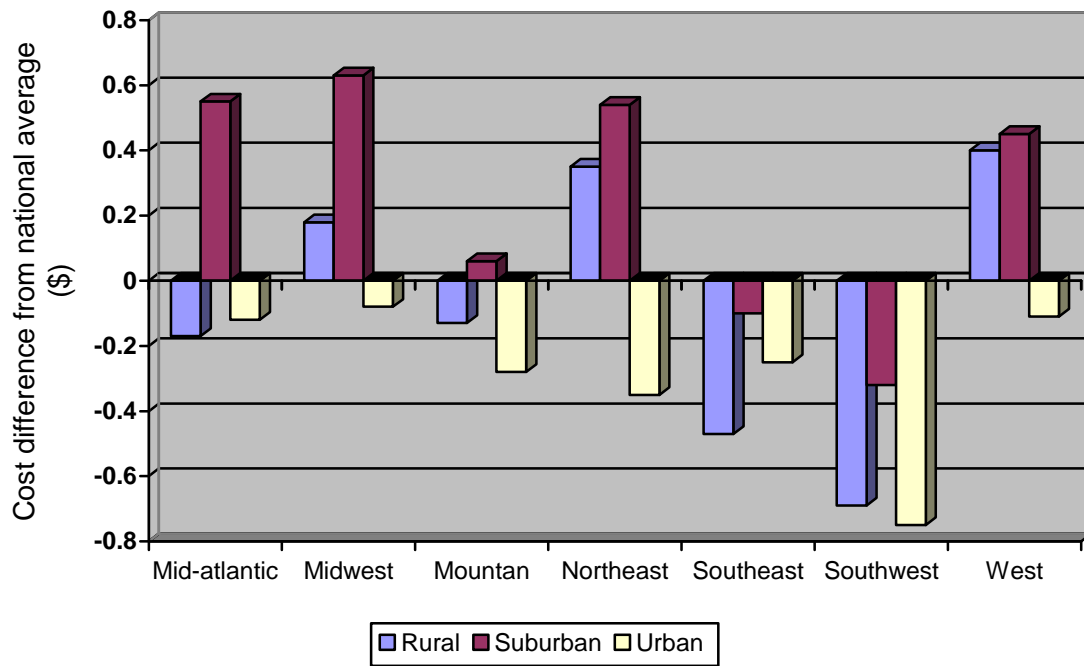
	Reference Region	-----Food Nutrition Service Region-----					
Variable	C <sub>SOUTH-EAST</sub>	C <sub>ATLANTIC</sub>	C <sub>MID-WEST</sub>	C <sub>MOUNT</sub>	C <sub>NORTH-EAST</sub>	C <sub>SOUTH-WEST</sub>	C <sub>WEST</sub>
	Reference	-----Change Relative to Southeast-----					
Intercept	-0.008 (-0.09)	-0.189* (-1.78)	-0.236** (-2.55)	-0.193** (-1.98)	-0.178* (-1.81)	-0.105 (-1.02)	-0.311*** (-2.91)
P <sub>LAB</sub>	0.327*** (19.39)	0.013 (1.16)	-0.007 (-0.67)	0.005 (0.53)	0.009 (0.82)	0.029*** (2.94)	-0.002 (-0.14)
P <sub>FOOD</sub>	0.608*** (36.34)	0.0002 (0.02)	0.034*** (3.12)	0.016 (1.55)	0.028** (2.49)	-0.003 (-0.034)	0.009 (0.76)
P <sub>SUPPLY</sub>	0.065*** (5.39)	-0.013* (-1.67)	-0.026*** (-3.40)	-0.022** (-3.01)	-0.037*** (-4.61)	-0.026*** (-3.70)	-0.007 (-0.86)
MEALS	0.966*** (38.18)	0.012 (0.68)	0.016 (0.92)	-0.003 (-0.14)	-0.017 (-0.88)	0.014 (0.86)	-0.009 (-0.50)
C <sub>SUBURB</sub>	0.027 (0.43)	0.067 (0.89)	0.098 (1.32)	0.007 (0.08)	-0.038 (-0.48)	0.034 (0.46)	-0.038 (-0.51)
C <sub>RUR</sub>	0.079 (1.25)	0.039 (0.50)	0.002 (0.03)	-0.037 (-0.44)	-0.100 (-1.18)	-0.002 (-0.02)	-0.038 (-0.51)

Notes: \*, \*\*, \*\*\* are 90%, 95%, and 99% levels of significance.

--All variables are standardized at their means; first-order coefficients interpreted as elasticities at the sample means; dummy variable capture shifts due to model attributes.

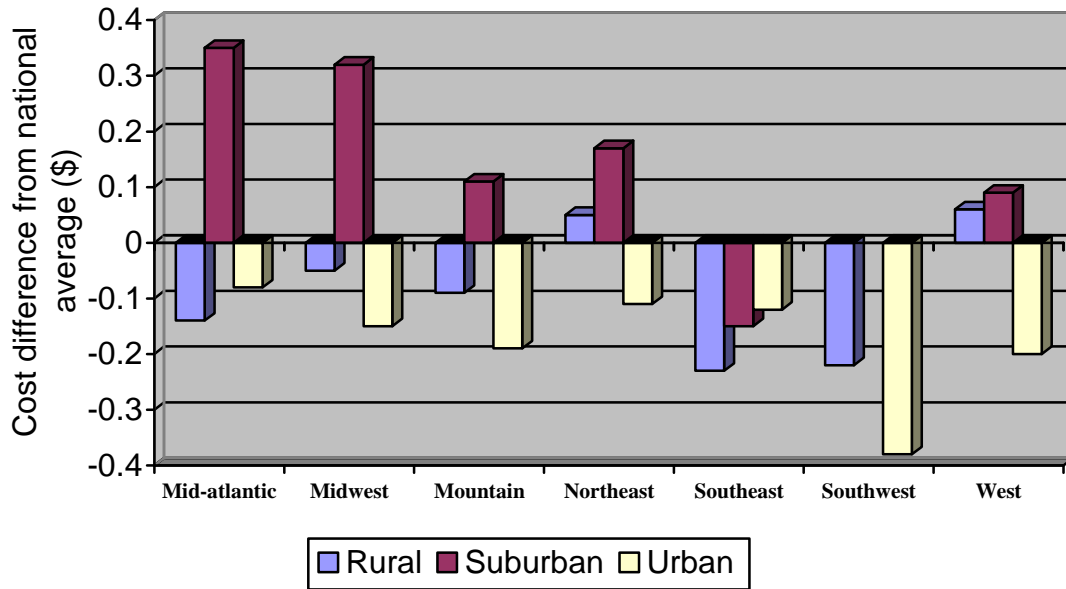
-- There were a total of 1,432 usable observations. The model R<sup>2</sup> was 0.9817.

**Figure 1 Southeast, Southwest, and Urban SFAs Have Lower Costs than the National Average<sup>1</sup>**



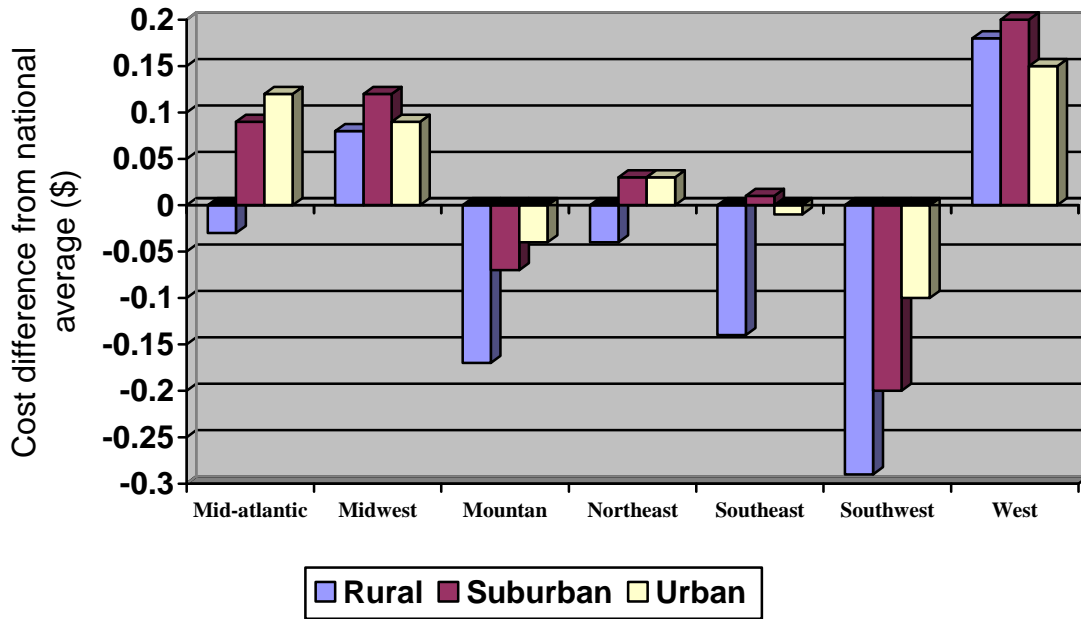


**Figure 2 Southeast, Southwest, and Urban SFAs Have Lower Food Costs than the National Average<sup>1</sup>**



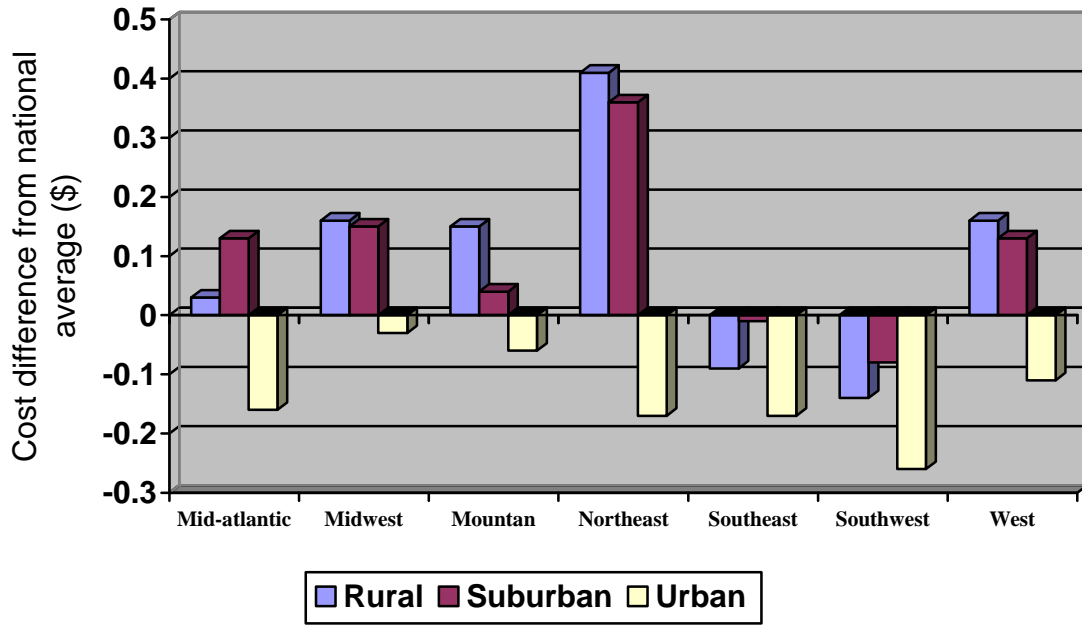
<sup>1</sup>Based on ERS estimates.

**Figure 3 West Has High and Southwest Low Labor Costs Relative to the National Average<sup>1</sup>**



<sup>1</sup>Based on ERS estimates.

**Figure 5: Southeast, Southwest, and Urban SFAs Have Lower Cost of Characteristics than the National Average<sup>1</sup>**



<sup>1</sup> Based on ERS estimates.

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