A Reassessment of the Social and Economic Benefits of Rural School on Local Communities: The Case of New York State

> John Sipple Sutee Anantsuksomsri Nij Tontisirin Joe Francis



Presented at the 2013 Federal Reserve System Research Conference, Washington, D.C. April 11, 2013

Introduction

- The role of **rural schools** in local communities has long been one of the key discussions among planners, education administrators, and policy makers
- School district consolidation has often forced many rural schools to close down to relieve fiscal stress of governments
- Yet, it is unclear to what extent the **socioeconomic impacts of school closure** has on local communities

Introduction

- Lyson (2002) shows that the presence of rural schools provide significant social and economic benefits to local communities
- Among his findings were that compared to rural communities without schools:
 - In smallest rural communities, the presence of a school is associated with higher housing values
 - Higher per capita income from self-employment is found in communities with schools
 - Higher proportion of workers in communities with school are employed within their villages

Lyson's Findings

			Village Pop	ulation		
	500 or under 501 to 2,500					
	School	No School	Difference (school-no	School	No School	Difference (school-no
Number of Village	36	28	school)	192	41	school)
Population Characteristics						
Age structure (see note below)						
under 18 (%)	28.7	29.1	-0.4	27.9	27.8	0.1
18-39 (%)	30.4	30.9	-0.5	30.7	31.4	-0.7
40-64 (%)	26.0	26.5	-0.5	25.6	25.9	-0.3
65 yr and over (%)	14.9	13.4	1.5	15.8	14.9	0.9
HH with children (%)	35.8	37.7	-1.9	34.7	35.0	-0.3
Children ages 3-17 enrolled in school (%)	83.8	82.9	0.9	84.1	83.6	0.5
Children ages 3-17 enrolled in priv. school (%)	3.9	4.1	-0.2	5.1	5.2	-0.1
White Population (%)	99.1	98.7	0.4	98.2	95.7	2.
Non-White Population (%)	0.9	1.3	-0.4	1.8	4.3	-2.!
Average house value (\$)	59,508	47,782	11,726.0*	62,329	58,832	3,497.
Median house value (\$)	57 450	43 500	13 950 0	58 450	50,052	8 050 (
Houses built within the past 20 years (%)	15.7	13.5	2.2	19.5	20.3	-0.8
Income and Welfare						
Household income (\$)	25,992	26,130	-138.0	26,860	26,752	108.0
Per capita income (\$)	11,914	11,574	340.0	10,722	12,201	-1,479.0
Households receiving public assistance (%)	6.3	7.5	-1.2	6.7	7.1	-0.4
Population in poverty (%)	10.6	11.6	-1.0	10.3	10.2	0.1
Children in poverty (%)	13.1	14.5	-1.4	13.4	13.6	-0.2
Occupational and Employment Characteristics						
Professional, managerial, executive workers (%)	38.4	34.0	4.4*	39.7	35.9	3.8
Households with wage income (%)	73.5	75.9	-2.4	73.5	74.9	-1.4
Per capita income from wage (\$)	8,170	7,861	309.0	8,787	8,586	201.0
HHs with income from self-employment (%)	15.4	12.7	2.7*	12.5	12.6	-0.3
Per capita income from self-employment (\$)	711	453	258.0*	652	564	88.0
Residents who work in village (%)	23.0	13.8	9.2*	28.2	16.3	11.9
Workers who commute < 15 min. to jobs (%)	42.4	36.7	5.7*	41.9	41.9	0.0

* p< 0.05 within community size categories

Introduction

- Lyson's analysis certainly sheds light on the benefits of the presence of schools on rural communities in the 80s (using data from 1990 US Census)
- What about the last two decades? Can we still see the same patterns as Lyson?
- This paper revisits Lyson's hypothesis tests by employing 2000 & 2010 Census and geoinformatic analysis of school locations in New York State.

Data & Methodology

- Data are primarily drawn from two databases:
 - 1. Census data
 - 2000 Census (short form & long form)
 - 2010 Census (decennial & ACS)
 - Census geography TIGER/Line[®] shapefile: rural incorporated villages in New York State (NYS) of both 2000 & 2010 Census
 - Public school directory from NYS Department of Education (2010) and Cornell Program on Applied Demographics (2000)

• Key variables include:

- population characteristics
- housing characteristics
- income and welfare
- occupational and employment characteristics

Rural villages

- Focusing on **rural villages** (i.e. incorporated villages with population 2,500 or less, by definition)
- These rural villages are further categorized by total population and presence of public schools



Where are rural villages?



	2000	2010*
Population 500 or less	73	66
Population 501 to 2,500	272	245
Population 2,500+ (urban)	705	846

*exclude 32 outliers (based on village's median house value)

Changes in rural villages

	Number of places						
Population in							
incorporated places	1990	2000	2010				
Rural	351	345	342				
<= 500	72	73	72				
501 - 1000	106	106	111				
1001 - 1500	77	73	69				
1501 - 2000	59	57	56				
2001 - 2500	37	36	34				
Urban	268	271	273				
> 2500	268	271	273				



Identifying presence of schools

- To identify rural communities with or without schools, we need to locate public schools in relation to rural communities
- This involves geocoding addresses of schools addresses are spatially referenced to pin down the coordinates of their locations
- Geocoding is a method that transform street addresses (i.e. 1600 Pennsylvania Avenue Northwest, Washington, DC 20500) into X,Y coordinates (i.e. 38.898331,-77.036394)
- Once school locations are identified, the ArcGIS spatial join operation is used to count the number of schools in each village

Geocoding Schools

Unmatched Example: PO Box Address

Helderberg Christian School, East Berne, NY

	A40	•	-	34 010201003032											
	A	В	С	D	E	F	G	Н	1	J	K	L	M	N	0
1	BEDSCode	County	District	InstitutionName	InstitutionType	CSO	StreetAddress	Citv	State	Zip+4 /	AreaCode	PhoneNumber	RecType	GradeOrg	
47	010201040002	01	010201	BERNE-KNOX-WESTERLO ELEM SCH	04	PRINCIPAL - MR. BRIAN COREY	1738 HELDERBERG TRAIL	BERNE	NY	120232926	18	8722030	1	1	
48	010201805052	01	010201	HELDERBERG CHRISTIAN SCHOOL	80	ADMINISTRATOR - MS. LESLIE WRAY	PO BOX 225	EAST BEF	NY	12059	18	7973977	2	1	
49	010306060000	01	010306	BETHLEHEM CSD	06	SUPERINTENDENT - MR. THOMAS DOUGLAS			NV	120543224	18	4397098	3		
50	010306060003	01	010306	ELSMERE ELEMENTARY SCHOOL	06	PRINCIPAL - MS. KATHERINE KLOSS	247 DELAWARE AVE	DELMAR	NY	120541404	518	4394996	1	1	
51	010306060004	01	010306	GLENMONT ELEMENTARY SCHOOL	06	PRINCIPAL - MS. LAURA HEFFERNAN	PO BOX 994	GLENMON	NY	120772908	518	4631154	1	1	
52	010306060005	01	010306	HAMAGRAEL ELEMENTARY SCHOOL	06	PRINCIPAL - MR. DAVID KSANZNAK	1 MCGUFFEY LN	DELMAR	NY	120544133	518	4394905	1	1	
E 0	K 010000000000	No.4	A10000		No.	DDIMORAL NO LEIDEDANAGOLIIGT	OF LINDON LADE	DELLAR	к в. 2	5 OOF 44 OF 0	É4 O	4007004	4	4	



PO BOX 225, East Berne, NY 12059



933 County Road 401, Westerlo, NY 12193

Locations of Rural Schools

Rural Schools in 2000

Rural Schools in 2010



Lyson's Findings

			Village Pop	ulation		
	500 or under 501 to 2,500					
	School I	No School	Difference (school-no	School	No School	Difference (school-no
Number of Village	36	28	school)	192	41	school)
Population Characteristics						
Age structure						
under 18 (%)	28.7	29.1	-0.4	27.9	27.8	0.1
18-39 (%)	30.4	30.9	-0.5	30.7	31.4	-0.7
40-64 (%)	26.0	26.5	-0.5	25.6	25.9	-0.3
65 yr and over (%)	14.9	13.4	1.5	15.8	14.9	0.9
HH with children (%)	35.8	37.7	-1.9	34.7	35.0	-0.3
Children ages 3-17 enrolled in school (%)	83.8	82.9	0.9	84.1	83.6	0.5
Children ages 3-17 enrolled in priv. school (%)	3.9	4.1	-0.2	5.1	5.2	-0.3
White Population (%)	99.1	98.7	0.4	98.2	95.7	2.
Non-White Population (%)	0.9	1.3	-0.4	1.8	4.3	-2.5
Average house value (\$)	59,508	47,782	11,726.0*	62,329	58,832	3,497.
Median house value (\$)	57.450	/13 500	13 950 0	58 / 50	50,052	8 050 (
Houses built within the past 20 years (%)	15.7	13.5	2.2	19.5	20.3	-0.8
Income and Welfare						
Household income (\$)	25,992	26,130	-138.0	26,860	26,752	108.0
Per capita income (\$)	11,914	11,574	340.0	10,722	12,201	-1,479.0
Households receiving public assistance (%)	6.3	7.5	-1.2	6.7	7.1	-0.4
Population in poverty (%)	10.6	11.6	-1.0	10.3	10.2	0.1
Children in poverty (%)	13.1	14.5	-1.4	13.4	13.6	-0.2
Occupational and Employment Characteristics						
Professional, managerial, executive workers (%)	38.4	34.0	4.4*	39.7	35.9	3.8
Households with wage income (%)	73.5	75.9	-2.4	73.5	74.9	-1.4
Per capita income from wage (\$)	8,170	7,861	309.0	8,787	8,586	201.0
HHs with income from self-employment (%)	15.4	12.7	2.7*	12.5	12.6	-0.3
Per capita income from self-employment (\$)	711	453	258.0*	652	564	88.0
Residents who work in village (%)	23.0	13.8	9.2*	28.2	16.3	11.9
Workers who commute < 15 min. to jobs (%)	42.4	36.7	5.7*	41.9	41.9	0.0

* p< 0.05 within community size categories

2000 Results

	Village Population							
	500 or under				501 to 2,50	0		
	School No School Difference		School	No School	Difference			
			(school-no			(school-no		
Number of Village	13	56	school)	125	143	school)		
Population Characteristics								
Age structure								
under 18 (%)	26.0	25.8	0.3	25.6	25.9	-0.3		
18-39 (%)	26.7	26.3	0.3	26.6	26.3	0.4		
40-64 (%)	33.5	31.6	2.0	31.1	32.3	-1.2*		
65 yr and over (%)	13.8	16.4	-2.6*	16.6	15.5	1.1*		
HH with children (%)	32.9	32.1	0.8	32.1	33.2	-1.1		
Children ages 3-17 enrolled in school (%)	89.8	90.4	-0.6	92.1	92.8	-0.7		
Children ages 3-17 enrolled in priv. school (%)	4.0	6.4	-2.3	8.2	10.4	-2.1*		
White Population (%)	97.6	96.6	1.0	96.1	95.0	1.1		
Non-White Population (%)	2.4	3.4	-1.0	3.9	5.0	-1.1		

Housing and Municipal Infrastructure Characteristics

Average house value (\$)	101,015	120,457	-19,441.7	119,136	176,822	-57,685.7*	
1990 Value	76,670	91,427	-14,757.0	90,424	134,208	-43,784.0	
Median house value (\$)	79,300	63,800	15,500.0	72,300	72,800	-500.0	
1990 Value	60,189	48,424	11,765.0	54,875	55,255	-380.0	
Houses built within the past 20 years (%)	15.1	10.1	5.0*	13.6	13.8	-0.2	
Income and Welfare							
Household income (\$)	45,230	42,523	2,706.8	42,290	53,536	-11,246.0*	
	34,330	32,275	2,055.0	32,098	40,634	-8,536.0	
Per capita income (\$)	21,659	21,351	308.4	21,555	26,051	-4,495.9*	
	16,439	16,205	234.0	16,360	19,773	-3,413.0	
Households receiving public assistance (%)	2.6	3.5	-0.9	2.9	2.6	0.3	
Population in poverty (%)	8.5	12.3	-3.8*	10.5	9.6	0.9	
Children in poverty (%)	11.9	17.6	-5.7*	13.3	13.0	0.3	
Occupational and Employment Characteristics							
Professional, managerial, executive workers (%)	29.4	28.4	1.0	32.9	35.7	-2.7*	
Households with wage income (%)	75.0	74.5	0.5	72.6	74.4	-1.9*	
Per capita income from wage (\$)	14,634	13,578	1,055.2	14,744	18,069	-3,325.2*	
HHs with income from self-employment (%)	12.9	13.2	-0.4	11.8	13.3	-1.5*	
Per capita income from self-employment (\$)	1,024	1,657	-632.6	1,305	1,864	-559.2*	
Residents who work in village (%)	20.9	16.8	4.1	24.2	18.1	6.0*	
Workers who commute < 15 min. to jobs (%)	34.9	32.4	2.5	37.0	32.4	4.5*	
	Average house value (\$) 1990 Value Median house value (\$) 1990 Value Houses built within the past 20 years (%) Income and Welfare Household income (\$) Per capita income (\$) Households receiving public assistance (%) Population in poverty (%) Children in poverty (%) Occupational and Employment Characteristics Professional, managerial, executive workers (%) Households with wage income (%) Per capita income from wage (\$) HHs with income from self-employment (%) Per capita income from self-employment (\$) Residents who work in village (%) Workers who commute < 15 min. to jobs (%)	Average house value (\$)101,0151990 Value76,670Median house value (\$)79,3001990 Value60,189Houses built within the past 20 years (%)15.1Income and Welfare34,330Per capita income (\$)21,659Households receiving public assistance (%)2.6Population in poverty (%)8.5Children in poverty (%)11.9Occupational and Employment CharacteristicsProfessional, managerial, executive workers (%)29.4Households with wage income (\$)14,634HHs with income from self-employment (\$)12.9Per capita income from self-employment (\$)1,024Residents who work in village (%)20.9Workers who commute < 15 min. to jobs (%)	Average house value (\$)101,015120,4571990 Value76,67091,427Median house value (\$)79,30063,8001990 Value60,18948,424Houses built within the past 20 years (%)15.110.1Income and Welfare15.110.1Household income (\$)45,23042,52334,33032,27521,65921,351Per capita income (\$)21,65921,351Households receiving public assistance (%)2.63.5Population in poverty (%)8.512.3Children in poverty (%)11.917.6Occupational and Employment Characteristics75.074.5Per capita income from wage (\$)14,63413,578HHs with income from self-employment (%)12.913.2Per capita income from self-employment (\$)1,0241,657Residents who work in village (%)20.916.8Workers who commute < 15 min. to jobs (%)	Average house value (\$)101,015120,457-19,441.71990 Value76,67091,427-14,757.0Median house value (\$)79,30063,80015,500.01990 Value60,18948,42411,765.0Houses built within the past 20 years (%)15.110.15.0*Income and WelfareHousehold income (\$)45,23042,5232,706.834,33032,2752,055.021,65921,351308.416,43916,205234.016,43916,205234.0Households receiving public assistance (%)2.63.5-0.9Population in poverty (%)8.512.3-3.8*Children in poverty (%)11.917.6-5.7*Occupational and Employment CharacteristicsProfessional, managerial, executive workers (%)29.428.41.0Households with wage income (%)75.074.50.5Per capita income from wage (\$)14,63413,5781,055.2HHs with income from self-employment (\$)1,0241,657-632.6Residents who work in village (%)20.916.84.1Workers who commute < 15 min. to jobs (%)	Average house value (\$)101,015120,457-19,441.7119,1361990 Value76,67091,427-14,757.090,424Median house value (\$)79,30063,80015,500.072,3001990 Value60,18948,42411,765.054,875Houses built within the past 20 years (%)15.110.15.0*13.6Income and WelfareHousehold income (\$)45,23042,5232,706.842,29034,33032,2752,055.032,098Per capita income (\$)21,65921,351308.421,55516,43916,205234.016,360Households receiving public assistance (%)2.63.5-0.92.9Population in poverty (%)11.917.6-5.7*13.3Occupational and Employment CharacteristicsProfessional, managerial, executive workers (%)29.428.41.032.9Households with wage income (%)75.074.50.572.6Per capita income from self-employment (%)12.913.2-0.411.8Per capita income from self-employment (\$)1,0241,657-632.61,305Residents who work in village (%)20.916.84.124.2Workers who commute < 15 min. to jobs (%)	Average house value (\$)101,015120,457 $-19,441.7$ 119,136176,8221990 Value76,67091,427 $-14,757.0$ 90,424134,208Median house value (\$)79,30063,80015,500.072,30072,8001990 Value60,18948,42411,765.054,87555,255Houses built within the past 20 years (%)15.110.1 5.0^* 13.613.8Income and WelfareHousehold income (\$)45,23042,5232,706.842,29053,5369 er capita income (\$)21,65921,351308.421,55526,05116,43916,205234.016,36019,773Households receiving public assistance (%)2.63.5 -0.9 2.92.6Population in poverty (%)8.512.3 -3.8^* 10.59.6Children in poverty (%)11.917.6 -5.7^* 13.313.0Occupational and Employment CharacteristicsProfessional, managerial, executive workers (%)29.428.41.032.935.7Households with wage income (%)75.074.50.572.674.4Per capita income from wage (\$)14,63413,5781,055.214,74418,069HHs with income from self-employment (\$)12.913.2 -0.4 11.813.3Per capita income from self-employment (\$)10,0241,657 -632.6 1,3051,864Residents who work in village (\$)20.916	Average house value (\$)101,015120,457 $-19,441.7$ 119,136176,822 $-57,685.7^*$ 1990 Value76,67091,427 $-14,757.0$ 90,424134,208 $-43,784.0$ Median house value (\$)79,300 $63,800$ 15,500.072,30072,800 -500.0 1990 Value $60,189$ 48,42411,765.054,87555,255 -380.0 Houses built within the past 20 years (%)15.110.1 5.0^* 13.613.8 -0.2 Income and WelfareHousehold income (\$)45,23042,5232,706.842,29053,536 $-11,246.0^*$ Ady 3032,2752,055.032,09840,634 $-8,536.0$ Per capita income (\$)21,65921,351308.421,55526,051 $-4,495.9^*$ 16,43916,205234.016,36019,773 $-3,413.0$ Households receiving public assistance (%)2.63.5 -0.9 2.92.60.3Population in poverty (%)8.512.3 -3.8^* 10.59.60.9Children in poverty (%)11.917.6 -5.7^* 13.313.00.3Occupational and Employment CharacteristicsProfessional, managerial, executive workers (%)29.428.41.032.9 35.7 -2.7^* Households with wage income (%)75.074.50.572.674.4 -1.9^* Per capita income from self-employment (%)12.913.2 -0.4 11.8<

2010 Results

	Village Population								
		500 or unde	er		501 to 2,50	0			
	School No School Difference		School	No School	Difference				
			(school-no			(school-no			
Number of Village	21	54	school)	103	139	school)			
Population Characteristics									
Age structure									
under 18 (%)	24.3	22.8	1.6	23.5	23.1	0.4			
18-39 (%)	25.4	25.6	-0.2	25.4	25.8	-0.4			
40-64 (%)	35.4	35.4	0.0	34.7	35.1	-0.4			
65 yr and over (%)	14.9	16.3	-1.4	16.3	16.0	0.4			
HH with children (%)	30.4	28.0	2.4	28.4	28.2	0.3			
Children ages 3-17 enrolled in school (%)	92.0	92.4	-0.4	92.1	91.2	0.8			
Children ages 3-17 enrolled in priv. school (%)	4.5	4.6	-0.1	9.0	7.2	1.8			
White Population (%)	97.8	95.8	2.0*	95.0	94.0	1.0			
Non-White Population (%)	2.2	4.2	-2.0*	5.0	6.0	-1.0			

Housing and Municipal Infrastructure Characteristics

Per capita income from self-employment (\$)

Workers who commute < 15 min. to jobs (%)

Residents who work in village (%)

	151105					
Average house value (\$)	164,483	126,470	38,012.9	156,597	152,825	3,771.9
1990 Value	98,589	75,805	22,784.0	93,862	91,602	2,260.0
Median house value (\$)	98,250	87,600	10,650.0	96,900	99,900	-3,000.0
1990 Value	58,890	52,507	6,383.0	58,081	59,879	-1,798.0
Houses built within the past 20 years (%)	9.6	7.8	1.9	8.2	9.1	-0.9
Income and Welfare						
Household income (\$)	50,582	45,690	4,892.5	49,699	51,311	-1,612.3
	30,318	27,386	2,932.0	29,789	30,755	-966.0
Per capita income (\$)	26,577	22,595	3,981.8	25,719	25,304	415.2
	15,930	13,543	2,387.0	15,416	15,167	249.0
Households receiving public assistance (%)	1.7	1.9	-0.2	2.1	2.3	-0.1
Population in poverty (%)	14.1	14.0	0.1	11.7	11.4	0.3
Children in poverty (%)	17.5	19.2	-1.7	15.6	14.8	0.8
Occupational and Employment Characteristics						
Professional, managerial, executive workers (%)	30.2	29.7	0.5	34.5	32.7	1.8
Households with wage income (%)	74.7	71.3	3.5	72.5	72.2	0.3
Per capita income from wage (\$)			-			-
HHs with income from self-employment (%)	10.2	11.8	-1.6	10.7	11.3	-0.7

23.6

25.7

14.3

22.0

9.3

3.7

22.7

6.6

19.8

8.9

2.9*

-2.4*

Summary of Regression Findings

	1990 (Lyso Village Po	n's results) opulation	20 Village Po	00 opulation	20 Village Po	10 opulation
	500 or under	501 to 2,500	500 or under	501 to 2,500	500 or under	501 to 2,500
	Difference (school-no school)	Difference (school-no school)	Difference (school-no school)	Difference (school-no school)	Difference (school-no school)	Difference (school-no school)
Housing and Municipal Infrastructure Characteristics						
Average house value (\$)	+*	+*	-	_*	+	+
Income and Welfare						
Household income (\$)	-	+	+	_*	+	-
Per capita income (\$)	+	_*	-	_*	+	+
Occupational and Employment Characteristics						
Per capita income from self- employment (\$)	+*	+	-	_*		
Residents who work in village (%)	+*	+	+	+*	+	+*

Discussions & Conclusions

- Different patterns are observed from data of both 2000 and 2010 compared to Lyson's results (1990 Census)
 - Smallest rural communities with schools have lower average house values in 2000, but higher in 2010
 - The larger rural communities with school experienced lower household and per capita income in 2000
 - Lower per capita income from self-employment in communities with school in 2000
- Gaps in average house value are large in 2000 (prior to 2008 economic crisis), but the patterns reverse in 2010, reflecting stability in house value in communities with schools
- Further studies include panel analysis (1990-2010) and examination of distance from village center to school.

Thank You

Question ?