Classmates Count

A study of the interrelationship between socioeconomic background and standardized test scores of 3rd-5th grade pupils in the Lancaster County public schools

(May 5, 2009)

for the Lancaster County economic development and sustainability plan

by
David Rusk
AMEREGIS
4100 Cathedral Avenue, NW #610
Washington, DC 20016-3584
(202) 364-2455 (phone)
Drusk@starpower.net
www.davidrusk.com

LANCASTER COUNTY SCHOOL ANALYSIS: EXECUTIVE SUMMARY

Introduction: In 1966, sociologist James Coleman released his path-breaking study, *Equality of Educational Opportunity*. Sponsored by the then-US Office of Education, Coleman and his research team examined pupil, family, and school characteristics for over a million public school children in search of factors that were associated with academic success.

The Coleman Report concluded that the socioeconomic characteristics of a child and of the child's classmates (measured principally by family income and parental education) were the overwhelming factors that accounted for academic success. Nothing else – expenditures per pupil, pupil-teacher ratios, teacher experience, instructional materials, age of school buildings, etc. – came close. *"The educational resources provided by a child's fellow students,"* Coleman summarized, *"are more important for his achievement than are the resources provided by the school board."* So important are fellow students, the report found, that *"the social composition of the student body is more highly related to achievement, independent of the student's own social background, than is any school factor."*[1]

For over four decades, educational researchers, including Coleman, have revisited, refined, and debated Coleman's original findings. There has been no more consistent finding of educational research that the paramount importance of a school's socioeconomic makeup on academic achievement.

Lancaster County findings: Covering 3rd, 4th, and 5th graders in 71 elementary schools in 16 school districts of Lancaster County, Ameregis's analysis re-confirms the common findings of such research.

1. **The socioeconomic status of a school's pupil population was the primary factor that was related to academic performance as measured by standardized tests.** In the Lancaster County public schools, for the 2007-08 school year the percentage of each of the 71 schools' 3rd, 4th and 5th grade test takers that were low income (that is, qualified for subsidized

[1] Quoted in Richard D. Kahlenberg. *All Together Now: Creating Middle-Class Schools through Public School Choice.* Brookings Institution Press: Washington, DC. (2001), page 28. See Appendix A for a discussion of the Coleman report and subsequent research.

school meals, or "FARM"[2]) was highly correlated with the variation in school-by-school passage rates at the Advanced and Proficient levels (that this study will characterize hereafter as "test scores"). Specifically, socioeconomic status accounted for

* 67% of the variation in math scores;

* 63% of the variation in reading scores; and

* 68% of the variation in scores on the combined test battery.

Measured at the level of the 16 school districts for the 2006-07 and 2007-08 school years combined, variations in several school inputs (instructional expenditures per pupil, pupil-teacher ratios, proportion of teachers with advanced degrees) were not correlated to test scores. Average years of teaching experience was positively related to higher test scores, but the socioeconomic status of the pupils they taught had seven times the influence of the teachers' efforts. While not statistically significant because of the small number of observations (16 highly divergent school districts), these findings are confirmed by other research.

2. **The test scores of low-income pupils improved significantly the more they were surrounded by middle class classmates.** For every 1% increase in middle class classmates, the average low-income pupil's test scores improved

* 0.15 percentage points in math; and, equally,

* 0.15 percentage point in reading.

In other words, the difference between a low income pupil's attending George Washington Elementary School in the Lancaster School District (a school with 94% low income classmates and only 6% middle class classmates) and that pupil's attending Nitrauer Elementary School in the Manheim Township School District (a school with only 10% low income classmates and 90% middle class classmates) would typically be *a 13 percentage point improvement in the probability that that low-income pupil would achieve proficiency or advanced level in reading and math.*

[2] **F**ree **A**nd **R**educed-price **M**eals. In 2007-08, the nationwide standard for free meals was up to $27,000 and for reduced price meals was up to $37,000 (for a family of four).

3. **Even more dramatic than just the raw benefit of mixing low-income pupils with middle class pupils is the benefit of mixing low income pupils *with middle class pupils who are performing at high academic levels*.** For every 1% increase in test scores of middle class classmates, the average low-income pupil's test scores improved

* 0.47 percentage points in math; and

* 0.66 percentage points in reading.

In other words, the difference between a low-income pupil's remaining in George Washington Elementary where low-income math test scores are 56% (and the five percent of their "middle-class" classmates also score 56%) and that pupil's attending Nitrauer Elementary where the nine-tenths of his/her classmates who are middle class score 95% should be an 18 percentage point improvement to 74% in math; for reading, from George Washington (low-income scores = 46%, "middle class" scores 66%) to Nitrauer (middle-class scores = 85%) should be a 12 percentage points improvement to 58%.[3]

3. **"Middle class" pupils reflect a wide range of family income and parental educational attainment; income sorting among different schools is extensive among "middle class" pupils and not just a practice resulting in the relative isolation of low-income pupils.** Our statistical analysis did show a decline of middle class pupils' proficiency levels as the percentage of low-income classmates increased – an apparent decline (0.20 percentage points) that was greater than the improvement for low-income pupils (0.15 percentage points). However, that apparent decline in middle class pupils' performance reflected the changing composition of the "middle class" in schools with increasingly higher percentages of low-income classmates.[4]

"Middle class" schools with relatively few low-income pupils had higher percentages of children from high income, largely professional

[3] Actual test scores for the ten percent of Nitrauer pupils who are low-income was 66% for math and 57% for reading in 2007-08.

[4] School records classify pupils' family incomes into three groups: eligible for free meals, eligible for reduced price meals, and not eligible for subsidized meals. "Low-income" typically covers the lowest 30% of family incomes, and "middle class" covers the higher 70% of family incomes – a very wide income range indeed.

households. For example, the six elementary schools in the Manheim Township School District averaged 16% low-income pupils (most of whom would have been members of single-parent families in Manheim Township). For Manheim Township's married couples with school age children, average family income was $97,430 and 39 percent of all adults (25 years and older) were college graduates.[5]

In "middle class" schools with larger numbers of low-income pupils, children from more modest "blue collar" households predominated. For example, Ephrata Area School District's four elementary schools averaged 24% low-income pupils. For the Ephrata area (Akron and Ephrata boroughs and Clay and Ephrata townships), the average income of married couples with school age children was $61,000 and 15 percent of all adults were college graduates.

From truly "low-income" schools, the middle class has largely disappeared. The ten elementary schools located within Lancaster City averaged 86% low-income pupils.[6] Married couples with children living in the city averaged $51,884 (lowest in the county); however, a majority of public school pupils came from one-parent families (male, single parent average income: $25,537; female, single parent average income: $19, 121). The percentage of college graduates was 14%, but perhaps more telling, 33% of adults had not graduated from high school. Though 93% of all elementary school aged city children (k-8) attended city public schools, a high percentage of children from higher income/educational attainment families undoubtedly attended private schools (such as the Montessori Academy, the New School, Resurrection and Sacred Heart) or were enrolled in "city" schools located in Lancaster Township (Burrowes, Elizabeth R Martin, James Buchanan).

---

[5] Income and educational attainment statistics are drawn from Census 2000, the last census survey that reported on each of Lancaster County's 60 cities, boroughs, and townships.

[6] I am excluding Thomas H Burrowes, Elizabeth R Martin, and James Buchanan elementary schools that are part of the Lancaster School District but are physically located within neighboring Lancaster Township. They do appear to enroll substantial numbers of "city" children because their FARM percentages (78%, 52%, and 61%, respectively) are too high for the socioeconomic levels of the township's own families (average family income of married couples with children was $80,708; 31% of adults were college graduates). The township's own single-parent families (512) could have provided only about one-third of the three schools' FARM pupils.

That was most likely the primary contributing factor to the apparent decline in "middle class" test scores and any directly adverse effect of having more low-income classmates within the classroom being minimal. Local performance levels never dropped below 70% of middle class pupils' achieving advanced and proficient levels under any socioeconomic circumstances in Lancaster County except within six city elementary schools whose "middle class" was mostly composed of pupils from families with very modest incomes and parental educational attainment.

Summary: These scholastic patterns reflect the reality that classmates are also playmates. Lancaster County's schools are quintessential neighborhood schools. Whatever may be transfer policies may be within the 16 school districts, there are no *inter-district* transfer policies. Where a child lives largely shapes his educational opportunities – not because of what the school board does but because of who his classmates are. **Housing policy *is* school policy.**

Part 1: Overview of Elementary Education in Lancaster County

Ameregis has done at least fifteen detailed school studies in different states and regions and examined demographic trends for public schools in more than 300 metropolitan areas. There are three overall characteristics about elementary education in Lancaster County that we find notable – the first two very common (unfortunately) and the third quite uncommon.

1. Public education is highly fragmented within Lancaster County.
2. County-wide, public elementary schools are highly segregated racially and ethnically and, to a lesser degree, economically.
3. The widespread system of private Amish and Mennonite elementary schools is quite striking; about 7,500 children attend 185 Amish and Mennonite schools. As a result a lower percentage of children are enrolled in public elementary schools in Lancaster County (78%) than is true except in some big cities in the nation.

Public education is highly fragmented within Lancaster County.

Lancaster County has 16 school districts plus a 17th district (the Octorara School District headquartered in neighboring Chester County) that serves Christiana Borough and Sadsbury Township.

David Miller at the University of Pittsburgh has devised the Metropolitan Power Diffusion Index (MPDI), a sophisticated measure of relative governmental fragmentation, for both general purpose governments and school districts throughout metropolitan areas. For counties, municipalities, and special districts the MPDI score is based on the share of each government's budget for 22 different public services as a function of the metropolitan area's total budget for those services; for school districts, the MPDI measures each district's share of the metropolitan area's cumulative education budget. The higher the score, the more the delivery of public services is spread out among multiple governmental units.

Thus, for a single county metropolitan area with a unified, county-wide school district, the public education MPDI would be 1.00; an example would be Miami-Dade County FL. Though it is a single county metropolitan area, but is also served by 17 school districts (plus the Lancaster County Career and Technology Center), the Lancaster area's MPDI is 3.88 (or 87th most "diffused") among 311 metro areas. Covering seven counties and 189 school

districts in two states, the Boston MA-NH metropolitan area's school MPDI was 11.43, the USA's most fragmented.

Table 1 ranks Lancaster and its twenty peer regions by their school MPDI.

Table 1
School MPDI for Lancaster and Peer Regions
(in 1992)

(best) 24 single-county metro areas with county-wide school districts in AK, FL, HI, LA, MD, NC, NV, TX & WY	
----------national midpoint 155th ----------	
Wheeling WV	154th
Wichita KS	128th
Erie PA	118th
Des Moines IA	99th
Appleton WI	94th
Lancaster PA	**87th**
Davenport IA	85th
Reading PA	79th
Saginaw MI	76th
Canton OH	73rd
York PA	65th
Johnstown PA	64th
Flint MI	62nd
Binghamton NY	60th
Utica NY	57th
Lansing MI	55th
Harrisburg PA	45th
Scranton PA	36th
Peoria IL	34th
Worcester MA	na
New Haven CT	na
(worst) Boston MA	1st

Thus, Lancaster and all its peer regions ranked in the bottom half as the most "diffused" (that is, fragmented) regions in the USA with regard to public education. Prior to the late 1960s, when each of the 60 cities, boroughs and townships had their own separate school districts, Lancaster's MPDI index would have been even higher. How it would have ranked nationally, however, is problematic, because during the 1950s and 1960s legislatures or state boards of education across the country consolidated over 80,000 separate school districts into about 16,000 school districts (typically, combining many sparsely attended rural districts). In 1955, there were 2,700 school districts in Pennsylvania before the General Assembly authorized school consolidations. By 1962, there were 600. At that time Lancaster County's current 16 school

districts came into being. Today, after the Center Area and Monaca school districts in western Pennsylvania voluntarily merge on July 1, there will be 500 school districts in Pennsylvania.

County-wide, public elementary schools are highly segregated racially and ethnically and, to a lesser degree, economically.

The Lancaster region and its peer regions also are ranked relatively high by indices of racial, ethnic and economic segregation.[7] This is not coincidental. There is a strong correlation between governmental fragmentation and segregation. Table 2 ranks Lancaster and its twenty peer regions by black-white school segregation.

Table 2
Black-White School Segregation for Lancaster and Peer Regions in 2000
(segregation index 0-100: 100 = total apartheid)

(best) Lakeland FL	22.3	328th
Appleton WI	45.3	224th
---------- national midpoint 164th ----------		
Scranton PA	55.9	146th
Binghamton NY	56.3	144th
Davenport IA	56.6	142nd
Wheeling WV	57.1	136th
Wichita KS	57.1	135th
Des Moines IA	58.5	123rd
Worcester MA	58.7	120th
Lancaster PA	**65.5**	**81st**
Canton OH	66.9	70th
Utica NY	68.0	65th
Reading PA	68.6	60th
Lansing MI	70.6	48th
Johnstown PA	72.0	39th
New Haven CT	72.1	38th
Erie PA	72.8	33rd
York PA	73.6	29th
Harrisburg PA	76.2	17th
Peoria IL	79.7	12th
Saginaw MI	81.1	9th
Flint MI	82.2	6th
(worst) Detroit MI	88.5	1st
National average (328 MSAs)	53.5	----

[7] The "segregation index" used is a common "dissimilarity index" that measures the unevenness of distribution of a minority population (e.g. African Americans, Hispanics, FARM pupils) against a majority population (e.g. whites, non-FARM, etc.) On a scale of 0 to 100, "0" means that every public elementary school would have exactly the same proportion of minorities as the county's public elementary school population as a whole; "100" would indicate total apartheid.

Thus, for African Americans, Lancaster and its immediate Pennsylvania neighbors (the Reading, York, and Harrisburg regions) all fall in the bottom quarter in terms of school segregation. (With a segregation index of 74.8, the Philadelphia PA-NJ region ranks 24th most racially segregated.)

Table 3 examines segregation of Latino pupils.

Table 3
Latino-White School Segregation for Lancaster and Peer Regions in 2000
(segregation index 0-100: 100 = total apartheid)

(best) Bremerton WA	20.0	328th
Flint MI	38.9	256th
Appleton WI	41.0	240th
----------national midpoint 164th ----------		
Davenport IA	48.5	152nd
Peoria IL	49.2	142nd
Scranton PA	49.6	133rd
Binghamton NY	50.6	124th
Johnstown PA	50.1	128th
Canton OH	51.2	119th
Wichita KS	52.6	105th
Lansing MI	53.2	100th
Saginaw MI	55.7	79th
Des Moines IA	58.8	62nd
Worcester MA	63.0	39th
Erie PA	64.7	36th
Harrisburg PA	65.1	33rd
York PA	65.9	30th
Utica NY	67.5	25th
New Haven CT	67.5	24th
Wheeling WV	68.5	22nd
Lancaster PA	**68.7**	**21st**
Reading PA	79.9	1st
(worst) Reading PA	79.9	1st
National average (328 MSAs)	48.1	---

Interestingly, though among all 3331 metro areas nationally Latino segregation indices average more than five points less than black segregation indices, Latinos were more segregated than blacks in Lancaster and Reading.

Table 4 measures economic school segregation – that is, the degree to which low-income children (FARM) are mixed in with middle class children (non-FARM). Economic segregation indices are invariably lower than racial and ethnic segregation indices because low-income white children are more

evenly scattered. American society still segregates more by race and ethnicity than by income.

Table 4
Economic School Segregation (FARM/non-FARM) for Lancaster and Peer Regions in 2000
(segregation index 0-100: 100 = total apartheid)

(best) Flagstaff AZ	8.5	311th
Appleton WI	19.0	299th
Scranton PA	27.5	262nd
Wheeling WV	28.2	258th
Binghamton NY	33.8	207th
Utica NY	34.6	195th
Johnstown PA	37.4	174th
---------- midpoint 153rd ----------		
Erie PA	42.0	135th
York PA	42.9	130th
Davenport IA	42.9	127th
Wichita KS	43.3	125th
Lansing MI	43.9	116th
Canton OH	43.9	115th
Des Moines IA	44.6	106th
Harrisburg PA	45.2	104th
Saginaw MI	47.5	85th
Lancaster PA	**48.6**	**74th**
New Haven CT	52.3	49th
Flint MI	53.5	39th
Worcester MA	56.0	23rd
Reading PA	57.5	17th
Peoria IL	na	na
(worst) Bridgeport CT	74.8	1st
National average (311 MSAs)	39.9	---

Finally, Table 5 averages the relative rankings of Lancaster and its twenty peer communities across all three categories – racial, ethnic, and economic segregation. Of the 21 regions in only Appleton WI and Scranton PA are public elementary school children more integrated than the national averages. In fact, the 15 metropolitan areas with the most racially, ethnically, and economically segregated public schools are Bridgeport CT, Newark NJ, Bergen-Passaic NJ, Cleveland OH, Chicago IL, New York NY, Milwaukee WI, Philadelphia PA-NJ, Buffalo NY, Springfield MA, Detroit MI, Boston

MA, Hartford CT, Rochester NY, and Reading PA. All are highly governmentally fragmented, "little boxes" regions although several feature giant (New York, Chicago, Philadelphia) or still large (Cleveland, Milwaukee, Detroit, Boston) central cities at their core.

Table 5
Combined rankings for racial, ethnic, and economic school segregation
for Lancaster and Peer Regions

(best) Jacksonville NC	327th
Appleton WI	288th
Scranton PA	188th
----------national midpoint 164th ----------	
Binghamton NY	160th
Davenport IA	136th
Wheeling WV	128th
Wichita KS	110th
Johnstown PA	104th
Canton OH	88th
Flint MI	85th
Des Moines IA	84th
Utica NY	81st
Lansing MI	67th
Peoria IL	58th
Erie PA	46th
York PA	44th
Worcester MA	39th
Lancaster PA	**36th**
Saginaw MI	35th
Harrisburg PA	30th
New Haven CT	20th
Reading PA	15th
(worst) Bridgeport CT	1st

Why should a proliferation of independent school districts be related to higher levels of economic and racial segregation? Two reasons:

1) Ameregis has worked extensively in the Detroit metropolitan area, the USA's most racially segregated and fifth most economically segregated region; Detroit also has the ninth worst MPDI for general government and the eleventh worst MPDI for public education. In the six-county. "little boxes" Detroit area, there are 239 municipal governments that, under state law, exercise "comprehensive" planning and zoning powers. In terms of public education outside of the large (but steadily shrinking) Detroit Public Schools are 115 independent suburban school districts.

From our observation the (generally) unspoken mission of most of those "little box" town councils and most of those "little box" school board is "to keep our town (or our schools) just the way they are for people just like us" –whoever 'us' happens to be. And so, what should function as a unified, regional society gets sub-divided among all these "little boxes" towns and school districts. By contrast, "Big Box" regions feature large central cities constantly expanding through annexation, fewer suburbs, no townships, empowered county governments for unincorporated areas, and often county-wide, unified school districts. While not exempt from many attitudes about race and class, "Big Box" city councils, county commissions, and school boards do serve broader, more diverse constituencies; "Big Box" governments are less likely to adopt narrowly exclusionary policies. Thus, governmental structure has a direct casual effect on relative levels of racial, ethnic and economic segregation.[8]

2) Although they maintained two separate (but hardly equal) school systems, the 17 legally segregated states prior to *Brown v. Board of Education* (1954) had "Big Box," often county-wide school districts. After *Brown*, under federal court directives, the separate systems were merged and, after *Swann v Charlotte-Mecklenburg Board of Education* (1971), the unified districts were required to implement desegregation plans (often involving "busing"). Thus, for several decades, Southern schools were more racially integrated than South neighborhoods. That trend is now being reversed as a more conservative federal judiciary is dismantling school desegregation plans.[9] In the North, the level of *de facto*

[8] The correlation between the school MPDI rankings of 269 metro areas and their ranking by school segregation is a solid 0.36 (with a *t*-factor of 12.25). See Part 2 for technical explanation.

[9] For example, in 1990, the Charlotte area's residential segregation index was 57 but its school segregation index was 37. However, Charlotte-Mecklenburg Public Schools, which was one of the most integrated school systems in the country, is rapidly heading toward re-segregation. In 1999, the *Swann* decision was overturned by U.S. District Court Judge Robert Potter, a busing critic, who declared the Charlotte-Mecklenburg school district to be "unitary. " The ruling resulted from a lawsuit brought by white advocates of so-called "neighborhood schools." (A majority of the Charlotte-Mecklenburg School Board was opposed to Potter's ruling, including all four African-American members.) Given that neighborhoods in and around Charlotte, like elsewhere, are largely divided along racial and ethnic lines, neighborhood school models

> school segregation often approached the South's level of *de jure* school segregation. After *Swann* the North was up in arms over the prospect of court-ordered integration plans. Just twenty years after *Brown*, the US Supreme Court decided that "home rule" trumped equality of opportunity when in *Milliken v Bradley* (1974) it ruled that Detroit's suburbs could only be compelled to participate in multi-school district desegregation with central city school districts if plaintiffs could prove that suburban school boards had conspired to create such *de facto* segregation. The Court's 5-4 majority turned a blind eye to the reality that the primary instruments of *de facto* segregation are zoning policies carried out by local municipal and county governments and not school boards. ("Housing policy *is* school policy.")[10]

Thus, "little boxes" regions lend themselves to greater segregation. Conversely, "Big Box" regions are a framework for more integrative policies.

Trends in Racial, Ethnic, and Economic Segregation

What have been the trends over the past several decades? Table 6 presents residential and school segregation trends over recent decades. The

---

make it virtually impossible for districts to avoid re-segregation. Judge Potter's ruling had an immediate effect. By the next year (2000), though the Charlotte area's residential segregation index had improved further to 53, its school segregation index had jumped to 46.

[10] Justice William O. Douglas' dissenting opinion held that: "Today's decision ... means that there is no violation of the Equal Protection Clause though the schools are segregated by race and though the black schools are not only separate but inferior…. Michigan by one device or another has over the years created black school districts and white school districts, the task of equity is to provide a unitary system for the affected area where, as here, the State washes its hands of its own creations."

Liberal legal historian Lawrence Friedman claimed that the impact of *Milliken* was: "The world was made safe for white flight. White suburbs were secure in their grassy enclaves .... Official, legal segregation indeed was dead; but what replaced it was a deeper, more profound segregation ... Tens of thousands of black children attend schools that are all black, schools where they never see a white face; and they live massed in ghettos which are also entirely black."

Quoted from Wikipedia: http://en.wikipedia.org/wiki/Milliken_v._Bradley

"segregation index" used is a common "dissimilarity index" that measures the unevenness of distribution of a minority population (e.g. African Americans, Latinos, FARM pupils) against a majority population (e.g. whites, non-FARM, etc.) across census tracts (for residential segregation) or elementary schools. On a scale of 0 to 100, for example, "0" means that every public elementary school would have exactly the same proportion of minorities as the county's public elementary school population as a whole; "100" would indicate total apartheid.

Since school enrollment patterns follow neighborhood patterns, let's examine residential segregation trends first.

Black residential segregation: For almost two centuries African Americans have been Lancaster County's only significant racial minority, accounting for up to 2.5 percent of the county's population in the first national census of 1790.[11] By 1950, the black population had more than tripled but had fallen to only 1.2 percent of the population. By 1970, Lancaster County had been divided for census purposes into 81 census tracts, allowing for calculation of a black/white segregation residential index of 75; in less statistical terms, what an index of 75 reflected was that 4,266 of the county's 5,365 Negroes (almost 80 percent) lived within Lancaster City – and 3,778 (70 percent) within just four census tracts.[12]

Over the next three decades, the level of residential segregation declined steadily from an index of 75 in 1970 to 69 (1980) to 68 (1990) to 58 (2000). By 2000, therefore, 61 percent of the county's black population (12,993) lived within the city (7,939) – but only 21 percent in the original four census tracts of highest concentration. By 2007,[13] the city's black population (7,846[14]) was 53 percent of the county's black population (14,678, or 3 percent of the total population). Thus, we can anticipate a

[11] Within a total population of 36,147 the 1790 census enumerated 348 slaves, the second largest total of any county in Pennsylvania after York County (499 slaves). The census also enumerated 545 "all other free persons." Having already enumerated "9,713 free white men of 16 years and upwards, including heads of families," "8,070 free white males under 16 years," and "17,471 free white females, including heads of families," and since the census didn't count American Indians at all, these 545 must have been overwhelming free blacks.

[12] These were census tracts 8, 9, 15 and 16.

[13] According to 2005-07 estimates of the Census Bureau's *American Community Survey*.

[14] Since the margin of error in the *American Community Survey* estimates was +/- 1,019, or 13 percent, for the city's black population, it should not be assumed that Lancaster City's black population declined between 2000 and 2007 in absolute numbers.

further reduction in the black-white segregation index from Census 2010 data.

Lancaster County tracks national trends in black segregation. Residential segregation of African Americans peaked around 1970; segregation indices averaged 84 in 16 large Northern metro areas (the highest was Chicago at 92) and 80 in 17 large Southern metro areas (the lowest was Greensboro-Winston Salem at 65). Thereafter, black residential segregation has dropped in all metro areas except New York and Newark (where an influx of Haitian and African immigrants probably masks the slow spreading out residentially of African Americans). Among the 16 large Northern metro areas the average segregation index improved modestly from 84 (1970) to 74 (2000) while the average index improved more rapidly from 80 (1970) to 64 (2000). Lancaster County's rate of improvement (17 points) matches the San Francisco-Oakland area's (80 to 62, or 18 points), falls short of the Los Angeles area's (91 to 68, or 23 points), and is far short of Norfolk-Virginia Beach-Newport News (76 to 46, or 30 points) and Oklahoma City (90 to 54, or 36 points).[15]

Latino residential segregation: Unfortunately, Lancaster County also tracks national trends in Latino segregation. Historically, Latino segregation indices averaged 30 to 35 points below black segregation indices. However, from 1980 onward, in metro areas of rapidly growing Latino population, Latino residential segregation rose, particularly in regions with minimal Latino populations before the migratory wave, such as Atlanta (34 in 1980 to 52 in 2000), Des Moines (34 to 47), Indianapolis (33 to 44), Raleigh-Durham (24 to 43), Greensboro-Winston Salem (32 to 51), and Washington, DC (31 to 48). Elsewhere, regions with relatively stable (though even large) Latino populations saw Latino residential segregation decline, such as "Big Box" Albuquerque, which, with its 42 percent Hispanic population, saw the segregation index drop from 46 to 41.

In 1970 (first census is which Hispanics/Latinos were enumerated as a category), there were 3,716 Latinos, or 1.2 percent of the county's population. By 2007, Latinos have become Lancaster County's largest minority, their numbers (33,323, or 6.7 percent) more than doubling blacks

[15] Not only are Norfolk-Virginia Beach-Newport News and Oklahoma City "Big Box" regions, but they also have major military installations that accelerated the push for fair housing.

and African Americans (14,678, or 3.0 percent).[16] Segregation indices rose steadily from 61 (1970) to 63 (1980) to a peak of 67 (1990), before abating somewhat to 62 (2000). In 2000, 65 percent of the Latino population lived within the city, outnumbering African Americans in every census tract. By 2007, however, only 54 percent of Latinos lived in the city; the process of dispersion into neighboring communities appears to be well underway.

To a degree, initially grouping together in "port of entry" neighborhoods have been an historic pattern for many immigrant groups. However, Lancaster County's Latinos are less and less recent immigrants. In 2000, 37 percent of Lancaster County Latinos had been born in Pennsylvania and another 18 percent had been born elsewhere in the USA (four out of five in nearby Northeastern states); 32 percent had been born in Puerto Rico (classified as a sub-category of "native born" by the Census Bureau) and 12 percent in other Latin American countries. However, 76 percent of Lancaster County's Latinos already lived in the county five years before. Six percent lived elsewhere in Pennsylvania and another 7 percent elsewhere in the Northeast. Only six percent had lived in Puerto Rico and another three percent elsewhere in Latin America.

Thus, only nine percent of the county's are recent immigrants. By 2007, only 54 percent of Latinos lived in the city; the process of dispersion from the "port of entry" into neighboring communities – typical of immigrant populations – after the initial influx appears to be well underway.[17]

Economic residential segregation: If residential segregation for African Americans and, more recently, Latinos has been declining, economic segregation by income has been increasing. Jim Crow by income is replacing Jim Crow by race.

Measuring the degree of segregation of poor people from all others, Lancaster County's economic segregation index edged upward from 27 (1970) to 31 (1980) to 33 (1990) before plateau-ing at 33 during the 1990s.

Even the apparent stabilization of economic segregation may be only a statistical artifact. Census 2000 collected income and poverty data for 1999, the peak year of the 1990s economic boom. Across America's metro

[16] There is some crossover between the demographic categories as 2,520 Hispanics reported their racial classification as black.

[17] It need hardly be noted, however, that African Americans, whose proportionate numbers in Lancaster County in 1790 (about 2.5 percent) were approximately the same over 200 years later (3.0 percent), have never been "immigrants" or "newcomers."

areas previously poor residents were gaining steady employment for the first time in decades, raising their incomes above the poverty threshold; the poverty rate declined in 59 of 104 of the USA's largest metro area, including Lancaster (from 8.5 percent in 1989 to 7.8 percent in 1999). This produced an improvement in economic segregation indices as a statistical artifact – that a family has temporarily nudged above the poverty line at a snapshot in time means that the neighborhood is less "economically segregated." Thus, Lancaster County's economic segregation index edged downward from 33.36 (1989) to 32.68 (1999).

By the time *American Community Survey 2007* collected its data, Lancaster County's poverty rate had gone up to 8.7 percent in 2006 – before the current economic recession. Collecting economic data for 2009, Census 2010 will likely paint a picture of a still-economically depressed nation. Economic segregation indices are likely to have resumed their upward trend in Lancaster County and larger metro areas across the country.

Racial and ethnic segregation indices are typically much higher than economic segregation indices. This reflects the fact that poor whites typically do not live in neighborhoods of concentrated poverty (that is, neighborhoods with 20 percent or higher poverty rates). In 1989, for example, Lancaster County had almost five times as many poor whites (24,632) as poor Latinos (5,436) and almost ten times as many poor whites as poor blacks (2,521). However, less than five percent of the county's poor whites lived in the region's six high-poverty census tracts.[18] By contrast, 76 percent of poor blacks and 73 percent of poor Latinos lived in high-poverty neighborhoods. Poor whites are mainstreamed in middle-class/working class neighborhoods. Poor blacks and poor Latinos are quarantined in high-poverty ghettos and barrios.

School segregation: Typically, except for Southern communities where court-ordered school integration plans are still in effect, public school segregation closely tracks residential segregation though school segregation indices are almost invariably higher. This occurs because

a) many neighborhoods, particularly city neighborhoods, are less racially and ethnically segregated for all age groups than they are for just children and youth 18 years of age or less (many childless white households still live there as empty nesters or yuppies moving in); and

[18] These were census tracts 1, 8, 9, 14, 15, and 16 – all in Lancaster City.

b) some families enroll their children in private schools, thus removing their children (who are part of the neighborhood mix) from the public school classroom mix.

Table 6 presents data on public elementary school segregation by race, ethnicity, and income from the 1989-90 school year in Lancaster County. The calculations have been done by three different sources: SUNY(the Lewis Mumford Center at the State University of New York in Albany; the Urban Institute in Washington, DC; and Ameregis (for this report).

Black school segregation: In 1989-90 the black school segregation index was 67 (SUNY) or 69 (Urban Institute) compared with a black residential segregation index of 68 for that year. A decade later, black school segregation was basically unchanged at 66 (SUNY) or 67 (Urban Institute) despite the finding that black residential segregation had declined to 58. Ameregis's calculation of black school segregation for 2005-06 (59) and for 2007-08 (62) reflect the decline in neighborhood segregation.

Latino school segregation: In 1989-90 the Latino school segregation index was 72 (SUNY) or 76 (Urban Institute) compared with a Latino residential segregation index of 67 for that year. A decade later, Latino school segregation had declined to 69 (SUNY) or 71 (Urban Institute), reflecting the slow diaspora of Latino to other neighborhoods both inside and outside the city. Ameregis's calculation of Latino school segregation for 2005-06 (65) and for 2007-08 (66) reflects the continuing slow decline in neighborhood segregation.

Economic school segregation: Across the USA, public schools collect family income data that divides pupils into just two or at most three groups: those that qualify for fully subsidized school meals, or "free lunches" (family income up to 135 percent of the federal poverty threshold); those that qualify for partially subsidized meals (family incomes from 136 percent to 185 percent of the federal poverty threshold); and all the rest. For 2007, the federal poverty threshold nationwide was $20,000 for a family of four. Thus, to qualify for a fully subsidized meal, the pupil's family could earn up to $27,000 and up to $37,000 to qualify for a partially subsidized meal.

Separate calculations are presented in Table 6 for economic segregation indices for "free lunch only" pupils and for all pupils receiving subsidized meals whether fully or only partially subsidized (FARM, or **F**ree **A**nd **R**educed-price **M**eals). Lancaster County schools did not begin

reporting economic data to the National Center for Education Statistics until 1999-2000 and earlier data are not recoverable without search of state archives. Thus, we can only present trend data covering less than a decade.

For 1999-2000, 18 percent of pupils in Lancaster County's public elementary schools qualified for fully subsidized meals ("free lunches"); for 2007-08, the percentage had risen slightly to 19.2 percent. The segregation index was essentially unchanged – 51 to 50. In 1999-2000, the percentage of FARM pupils was 26.6 percent – a proportion that was unchanged in 2007-08 (26.2 percent). However, the economic segregation index for FARM pupils had declined slightly from 49 to 45 (a trend that seemed to be confirmed by an index of 44 for 2005-06).

Thus, these two trends suggest that partially subsidized families ($27,000 to $37,000) were moving into a wider range of neighborhoods more rapidly than fully subsidized families (less than $27,000). Poorer families remain highly concentrated within city neighborhoods and city schools. Lancaster (City) School District enrolled only one-sixth (16.5 percent) of the region's public elementary school pupils in 2007-08 but had fully one-quarter (27.6 percent) of partially subsidized meal pupils and over half (55.4 percent) of all fully subsidized meal pupils. The educational consequences of such economic segregation will be explored in Part III.

With 185 private Amish and Mennonite schools a lower percentage of children attend public elementary schools in Lancaster County (78%) than other than in big cities.

The patterns of racial, ethnic, and economic segregation in Lancaster County's public schools are typical of metropolitan regions, particularly "little boxes" regions with multiple school districts. As we have seen, Lancaster County is far from the worst example.

What is truly unique is the extensive system of private Old Order Amish and Old Order Mennonite schools. A very useful website[19] lists a total of 399 public and private elementary and secondary schools in Lancaster County (behind only to Philadelphia County's 548 schools and Allegheny County's 532 schools (both three times Lancaster County's population). Table 7 categorizes the 200 private elementary schools listed (excluding private pre-schools).

[19] http://pennsylvania.schooltree.org/Lancaster-County-Schools.html

Table 7
Private elementary schools in Lancaster County

Type	no.	pupils	average
Amish	144	4,279	30
Mennonite	41	3,208	78
Nondenominational Christian	2	571	286
Nonsectarian private	5	321	60
Roman Catholic	7	1,699	243
Seventh Day Adventist	1	10	10
Total	200	10,088	na

The 144 Amish schools are all one-room school houses[20] where classroom instruction ends at eighth grade; there are no Amish high schools. Home-supervised vocational instruction may continue but a United States Supreme Court decision in 1972 exempted Amish and Mennonite children from compulsory school attendance upon completion of eighth grade. The Amish schools are located in Pennsylvania Dutch country, particularly in East Earl, Caernarvon, Bart, and Earl townships (where over half of all elementary school children attend Amish and Mennonite schools) and, of course, in Leacock Township, where an extraordinary 83 percent of the children attend Amish schools. Overall, 4,279 children attended Amish schools in 2007-08 (about 14 percent of the county's 1st through 8th graders).

The 41 Mennonite schools offer a somewhat more varied structure. The great majority (27) follows the 1st through 8th grade format, but a half dozen have added kindergarten. Seven extend the curriculum through ninth grade, while Fairhaven Christian in Gap goes through 11th grade and Pleasant Valley Mennonite in Ephrata covers grades 1 through 12 (total enrollment for all twelve grades was 139). In a dozen schools, enrollment exceeds 100 pupils with Kraybill Mennonite in Mount Joy topping the list at 404 pupils. Clearly such schools require multiple teachers in multiple classrooms. All told, 3,208 children attend Mennonite schools (discounting kindergarteners and students in grades 9 to 12, less than 10 percent of the county's 1st through 8th graders).[21]

[20] With 78 pupils enrolled, Creek Hill School in Leola may have two classrooms; another half dozen Amish schools have over 40 students enrolled that may press the one-room format.

[21] Because my focus was on elementary schools, table 7 does not include Lancaster Mennonite Middle School nor Lancaster Mennonite High School.

Census 2000 reported that only 79 percent of 1st through 8th graders attended public schools in Lancaster County. Table 8 compares this percentage with sample counties and cities.

Table 8
Percentage of 1st through 8th graders
enrolled in public schools in 2000

Community	percentage
Lancaster County	79%
York County	90%
Berks County	89%
Dauphin County	88%
Chester	81%
Pittsburgh city	79%
Philadelphia city	76%
USA average	89%
Washington DC	85%
Baltimore City	84%
Chicago	84%
New Orleans (pre-Katrina)	82%
New York City	81%
The Bronx	86%
Queens	83%
Brooklyn	80%
Manhattan	77%
Staten Island	77%
San Francisco	73%

A clear pattern emerges. Nationwide, 89 percent of 1st through 8th graders attend public elementary schools. Lancaster County's neighboring counties conform to that average – York (90%), Berks (89%), Dauphin (88%) – except for Chester County (81%) that has a large and diverse array of religiously affiliated elementary schools, including 11 Amish schools in the western parts of the county.

Though Ameregis has not attempted a wide-ranging survey, we suspect that no semi-rural county in the USA matches Lancaster County's proportion of private school pupils. (There is, for example, no comparable network of Mormon schools in Utah.) What Lancaster County most approximates are enrollment patterns in some big cities that tend to have large Catholic school systems (e.g. Pittsburgh, Chicago, Philadelphia) and many private, non-

sectarian schools to which wealthy, white parents can flee to avoid heavily minority, low income public schools (e.g. Manhattan, San Francisco).[22]

What are the consequences of Lancaster County's uniqueness? We must assume that their educational choices "work" for the tight-knit, self-contained Amish and Mennonite communities for whom, in economic terms, the outside world serves not as employers and co-workers but as consumers.

But these circumstances do compel revisiting certain assumptions about Lancaster County's economy. For example, the percentage of Lancaster County adults 25 years of age or older with bachelor's degrees of higher is 23 percent in 2007; that compares unfavorably with the national average of 27 percent. However, if we factor out an estimated 15 to 20 percent of the adult population that are Amish or Mennonite, the percentage of non-Plain Folk college graduates increases to 27 to 29 percent.

That higher percentage may be the more relevant measure for Lancaster County's competitiveness in the national economy.

[22] Solidly middle-class Staten Island has a proliferation of religiously affiliated elementary schools, including two dozen Catholic schools and a half a dozen Jewish schools.

Part 2: Study Methodology

a. School Report Cards

In compliance with the federal No Child Left Behind (NCLB) law, the Pennsylvania Department of Education publishes annual "report cards" for every public school on the Internet. Ironically, adhering strictly to the minimum federal reporting requirements, the official report cards provide less information in some respects than they did before NCLB. These report cards have been the primary source of information on standardized test results used in this study.[23] The most critical element of the study – the comparative performance of "low income" pupils ("FARM," or those eligible for **F**ree **A**nd **R**educed price **M**eals) and "middle class" pupils (non-FARM) – has been compiled exclusively from these on-line report cards for 2007-08.[24]

However, the report cards themselves provide data only for 3rd, 4th, and 5th graders being tested and do not provide basic demographic data about the entire student body. In order to calculate up-to-date segregation indices, Ameregis compiled the racial composition of each school from a privately sponsored website that, in turn, compiles its data from official reports;[25] this website was also the exclusive data source for information on private schools discussed. Finally, another private website (also compiling official data) was utilized to fill in or crosscheck certain information.[26] All are available to any parent, student, or member of the public, and I have relied on these reports exclusively for this study. However, though data are summarized at the state and individual school district levels, compiling the data for a multi-school study like this one requires considerable dedication and patience. Unlike the state of Connecticut's school report card system, one cannot simply order up customized spreadsheets over the Internet.

---

[23] The NCLB report card for Adamstown Elementary School in Cocalico School District, for example, can be accessed at http://www.paayp.com/report_cards/PA/RC08S113361303000002510.PDF.

[24] Report cards for earlier years are no longer available on-line and hard copies must be requested from the Pennsylvania Department of Education.

[25] For Adamstown ES this url is http://pennsylvania.schooltree.org/public/Adamstown-Elementary-073658.html.

[26] For Adamstown ES this url is http://www.greatschools.net/modperl/browse_school/pa/592.

In addition to providing overall test scores for each school's pupil population, the state-sponsored report cards break down results by different categories of pupil characteristics – by gender, by race and ethnicity, by disability status, by migrant status, by Limited English Proficiency (LEP), and, most importantly for this study, by general economic status.

Out of all the potential information, Ameregis culled out what we believed to be the most insightful items for this inquiry. The study goals were three-fold:

1) to analyze the relationship between pupils' socio-economic status (as measured by eligibility for subsidized school meals) and standardized test scores and compare this relationship with other possible factors influencing pupil academic achievement;

2) to analyze the impact of different percentages of middle class classmates on test scores of low income pupils; and

3) to analyze the impact of different percentages of low income classmates on test scores of middle class pupils.

The study had the following parameters:

1) The study focused on 3rd, 4th and 5th grade standardized test scores administered under the Pennsylvania System of School Accountability (PSSA). Standardized tests were also given at the middle school and high school levels. However, Ameregis excluded middle school and high school results for two reasons. First, there would be many fewer middle and high schools than elementary schools, reducing the statistical reliability of any findings at the secondary school level. Second, though the proportion of pupils applying for subsidized meals in middle schools usually tracks eligibility at the elementary school level, across the USA the proportion of high school students receiving subsidized meals drops off sharply. Some analysts have speculated that many parents may have progressed to higher income levels by the time their children reach high school or that teenagers earning themselves lift family incomes higher. Ameregis believes the reasons are simpler. Many teenagers hate cafeteria food

and, with some money in their pockets (often from after-school jobs) and with the option of going to a nearby MacDonald's, they pass up subsidized lunches. Also, many may not want to be stigmatized as being poor in the eyes of their peers.

2) What Ameregis refers to as test "scores" are, to be precise, the percentage of test takers who met the minimum standards for achieving "proficient" and "advanced" status. Under PSSA, "proficient" and "advanced" are deemed acceptable levels, while "Below basic" and "basic" are judged unacceptable, requiring remedial action. Publicly available PSSA data did not allow determining by how much the average student exceeded the minimum threshold for each level. In that sense, these "test scores" differ from scores on SAT and ACT college entrance exams or on other nationally-normed standardized tests like the Comprehensive Test of Basic Skills (CTBS) or the Iowa Test of Basic Skills (ITBS) that provide more fine-tuned academic assessments on a continuous scale. While such nationally-normed tests allow inter-state comparisons, Pennsylvania's adherence to its own-state devised exams do not allow such comparisons.

3) The FARM/non-FARM comparative study was limited to tests reported in the 2007-08 report cards. However, we combined these scores with 2006-07 scores to establish the initial correlation between FARM and test scores.

4) The school report cards report both 3rd, 4th, and 5th grade scores for reading and math for two years (2006-07 and 2007-08) and summarize scores across all three grades for reading and math for the latter year. We utilized the summary scores and further combined reading and math school-wide averages to produce a school-wide test "battery" score. Test scores (particularly among young children) are notorious for their wide variations from year to year and from subject matter to subject matter.[27] Averaging always smoothes out some of the

[27] For example, in 1994-95, the Urban Institute and David Rusk studied the relationship between economic status and test scores for 1,108 children from public housing households in the Albuquerque Public Schools. There was only a 0.51 correlation

random variations. Thus, the final comparative statistical analyses average scores at three levels: a) from the individual pupil to entire grades; b) combining three grades; and c) combining reading and math scores. That provides six different observations for the two groups (FARM and non-FARM).

5) As the data were available, Ameregis could have utilized scores from 2006-07 and well as from 2007-08. However, this would have tripled the amount of painstaking data entry for a relatively small improvement in statistical reliability.[28]

6) In order to maintain the confidentiality of results for individual pupils, it is PSSA policy to suppress test score results when the number of pupils in a given category is less than ten. This is certainly an understandable and defensible policy, but it means that for schools with very small numbers of black or disabled or low-income, etc. test takers, test results are unavailable both for the small minority *and for the large majority*. Thus, one of the study's central hypotheses – that low-income pupils learn best in middle class schools – was somewhat hampered by the unavailability of data for a "best-case" scenario (when low-income pupils were typically less than 10 percent of total test takers).

Finally, there were two notable data shortcomings of PSSA report cards. First, and most important, they do not allow cross-tabulating pupil characteristics. For example, PSSA reports what percentage of pupils were white and what percentage of pupils were low income, but one could not derive what percentage of pupils are low income whites.

Second, data on school inputs (as contrasted with pupil characteristics) are presented only at the school district level. Thus, we could analyze the relationship of expenditures per pupil, pupil-teacher ratios, etc. only at the level of the 16 school districts – such a small and over-generalized data set as

---

between a typical public housing child's 3rd grade reading scores and the same child's 5th grade reading scores – a strong correlation in many circumstances but startlingly low in comparing results from the same child.

[28] As it is, we hand-copied from Internet screens and entered over 4,000 data items into spreadsheets.

to be statistically unreliable although such analysis does provide useful insights.

b. Statistical Method

Except as otherwise noted, the primary statistical method used was linear, least-squares regression analysis. Linear regression measures to what degree a dependent (or *y*) variable was related to an independent (or *x*) variable. Relating a dependent variable to multiple independent variables is termed "multi-variate analysis;" each of the independent variables acts as a "control" for the others.

The strength of the relationship is measured by the *adjusted r-square*. If the value of the adjusted r-square is 1.00, that means that changes in the independent variable (*x*) will always produce the same proportional changes in the dependent (*y*) variable. In simple terms, the closer the adjusted r-square approaches 1.00, the more the independent variable "explains," "accounts for," or "is correlated with" the dependent variable.

At the other extreme, if the adjusted r-square is 0.00, that means that there is no relationship between changes in *x* and changes in *y* – the two variables have no relationship to each other. There is no "correlation."

If one depicts an array of data on a two-axis scatter plot and there is a measurable degree of correlation, the data points will tend to group around an imaginary straight line running through the data points that can be drawn based on least-squares linear regression. If the data points are grouped closely above and below the line, there is a high degree of correlation. If they are scattered widely above and below the line, the correlation is low.

The *coefficient estimate* measures the degree to which a unit change in *x* (the independent variable) produces a change in the value of *y* (the independent variable). Suppose, for example, that *x* is a school's percentage of low income 4th graders and *y* is the school's average 4th grade reading score (that is, the percentage of 4th graders that achieve proficient or advanced levels). If the coefficient estimate of *x* is -0.59, then every 1% increase in the percentage of low income 4th graders will be associated, on average, with a 0.59 percentage point decline in the school's reading score.

A positive sign for the coefficient estimate means that changes in the *x* variable are related to changes in the *y* variable in the same direction: a

higher *x* produces a higher *y* – a lower *x* produces a lower *y*. A negative sign for the coefficient means that changes in *x* are associated with changes in *y* in the opposite direction: a higher *x* means a lower *y* – a lower *x* means a higher *y*.

The *standard error* of a coefficient estimate can be used to calculate a confidence region around the coefficient estimate. The commonly sought 95% confidence region, for example, is the region within 1.96 standard errors of the coefficient estimate. Roughly speaking, the confidence region is the area within which the true coefficient is likely to lie with 95% confidence. (The exact definition is far more complicated.)

Good researchers normally focus their discussion of results on coefficient estimates that are statistically significant. These are coefficient estimates that have t-statistics (the coefficient estimate divided by the standard error) that are more than 1.96. Focusing on coefficient estimates this large reduces (in reverse English) the probability of incorrectly saying that there is an effect of x on y to less than 5%. Focusing on even larger coefficient estimates (say, with t-stats over 2.57) reduces this probability to less than 1%. Looking at smaller coefficient estimates (those with t-stats as low as 1.64) increases the probability to 10%. In the tables presented, we denote t-stats over 1.64 with *; over 1.96 with **; and over 2.57 with ***.

The standard error reflects both the number of observations (*n*) and the degree to which the data points are scattered tightly or loosely around the regression line. In general, the more tightly the data points are packed around the regression line and the larger the number of observations, the smaller is the standard error. The more widely the data points diverge from the regression line and the smaller the number of observations, the larger is the standard error. The standard error, in effect, expresses mathematically what can otherwise be seen graphically in a scatter plot.

The next section analyzes data for only 16 school districts (that is, *n* equals 16). *These results are statistically suspect.* Later sections deal with observations from 70 and 71 elementary schools in Lancaster County (that is, *n* equals 70 or 71). Those results will be much more statistically reliable.

Part 3: Pupil Factors or School Factors?

Analyzing data summarized at school district level is more statistically dubious than the proverbial comparison of apples and oranges. In 2007-08, the mix of Lancaster County's 16 school districts ranged from a watermelon (Lancaster SD: 20 schools [K-12], 11,597 students [K-12]) to a peach (Cocalico SD: 6 schools, 3,606 students) to a grape (Manheim Central SD: 5 schools, 1,107 students). Yet all must be given equal weight because data on what might be called "school board factors" were only provided at school district rather than at individual building level.

WWW.greatschools.com provides information on school board factors regarding:

cost: total expenditures per pupil, further apportioned among the following categories: instruction, support, administration, and other for 2007-08; and

staffing: pupil-teacher ratios for 2007-08 and (from the 2005-06 reports that Ameregis had compiled a year ago) average years of teaching experience and average years of higher education.

These same reports provide student demographics regarding racial composition and economic status (percentage FARM) for 2007-08.[29] These can be called "pupil factors."

Finally, the reports provide four years of data (2004-05 through 2007-08) regarding the percentage of 3rd, 4th, and 5th graders that achieved proficient and advanced levels in reading and math. (Such information is also available for 6th, 7th, 8th, and 11th grade for a broader menu of subjects but, with our study focused on elementary schools, we have not recorded nor analyzed that information.) From this data we calculate a "battery" test score covering 24 district-level observations (all three grades, all four years and both subject matters).

Thus, to answer the question of the relative impact of "school board factors" and "pupil factors" on academic performance, we have conducted the following regression analysis:

[29] We did not record nor analyze the data on racial composition because, without the ability to cross reference racial data to income data, such analysis can lead to invalid observations as shown by other, much more detailed research.

- The dependent (or *y*) variable is each district's percentage of elementary school pupils achieving proficient and advanced levels (combined) on the test battery. The success rate ranges from a low of 54 percent (Lancaster SD) to a high of 85 percent (Lampeter-Strasburg SD and Manheim Township SD). The 16-district average success rate (non-weighted) is 77 percent (above the state average of 74 percent).

- The first independent variable (X_1) is the percentage of low-income pupils (FARM), a pupil factor. The FARM percentage ranges from a low of 12 percent (Manheim Township SD) to a high of 69 percent (Lancaster SD). The 16-district FARM average (non-weighted) is 23 percent (lower than the state average of 30 percent).

- The second independent variable (X_2) is the pupil-teacher ratio. The range of variation is small – from 14 pupils per teacher (Columbia Borough SD) to 17 (Donegal, Elizabethtown Area, Hempfield, Solanco, and Warwick SDs). The 16-district average (non-weighted) is 16 pupils per teacher compared to a statewide average of 15 pupils per teacher.

- The third independent variable (X_3) is instructional expenditures per pupil. The low is $4,583 per pupil (Solanco SD) and the high is $6,441 per pupil (Lancaster SD) – a range of variation of 29 percent. The 16-district average (non-weighted) is $5,339 per pupil compared to a state average of $5,999 per pupil.

- The fourth independent variable (X_4) is average years of teaching experience. The low is 12.9 years of teaching experience (Donegal, Lampeter-Strasburg, and Lancaster SDs) and the high is 15.3 years of teaching experience (Manheim Central and Pequea Valley SDs). The 16-district average (non-weighted) is 13.9 years of teaching experience. (State-level data are no longer available).

- The fifth independent variable (X_5) is average years of education of each district's teachers; the value of 4.0 represents a bachelor's degree so higher values are an indication of additional degrees. Again, the range is small from 4.2 years (Ephrata Area and Lancaster SDs) to 4.6 (Manheim Central and Warwick SDs). The 16-district average (non-weighted) is 4.4, indicating (if we ignore the occasional doctorate) that approximately 40 percent of public school teachers in Lancaster County hold master's degrees. (State-level data are no longer available).

Table 9 summarizes the multi-variate regression analysis relating the dependent (*y*) variable to the five independent (*x*) variables.

Table 9
Relative impact of pupil and school factors on test scores

n = 16
adjusted r-square/correlation **= 0.856**
standard deviation = 0.029

dependent (y) variable = 4-year average percentage of 3rd, 4th, and 5th grade pupils achieving proficient and advanced on test battery

independent variables	t-stat	significant?	coefficient
X1 = pct FARM	**-6.76**	yes***	**-0.535**
X2 = pupil-teacher ratio	-1.07	no	-0.013
X3 = instructional dollars per pupil	0.53	no	0.000
X4 = years of teaching experience	**2.76**	yes***	**0.030**
X5 = years of teacher education	-1.17	no	-0.110

*** means statistically significant at > 99% probability not random effect

Overall, though the number of observations (16 school districts) was low, *diminishing the statistical reliability of the findings*, the explanatory value of the five independent variables combined is very high; the adjusted r-square is 0.856. Though statisticians always caution that correlation does not automatically prove causation, in layman's terms, these five factors collectively "explain" 86 percent of the district-by-district variation in test scores.

What were the relative contributions of the five independent variables?

School Board Factors: Of the four school board factors three had no statistically significant effect whatsoever on test scores: pupil-teacher ratios, instructional expenditures per pupil, and average years of teacher education. Average years of teaching experience, however, did have a solid statistically significant (a t-factor of 2.76) and positive effect: the more experienced the teachers, the higher the test scores. However, the effect of having more experienced teachers was modest: according to the coefficient estimate, for every increase of one full year in the average teacher's experience, test scores would go up three percentage points (that is, the percentage of pupils achieving proficient and advanced levels would go up three percentage points). Thus, hypothetically, if Donegal, Lampeter-Strasburg, and Lancaster SDs (average teaching experience: 13.9 years) had experienced teachers at the level of Manheim Central and Pequea

Valley SDs (average teaching experience: 15.3 years), test scores would improve by 7.2 percentage points.

Pupil factors: By contrast with school board factors, our pupil factor (percentage of FARM pupils) has a powerful and negative statistical significance (a t-factor of - 6.76) that dominates the analysis. For every one percent increase in FARM pupils, test scores will decrease 0.535 percentage points. In fact, regressing the two significant factors independently (not illustrated) reveals that, standing alone, percentage FARM has an adjusted r-square of 0.757 while average years of teaching experience, standing alone, has an adjusted r-square of 0.118. Added together (0.875), the two factors account almost precisely for the adjusted r-square of the five-variable regression (0.856). However, the pupil factor (percentage FARM) has six and one-half times the impact of the school board factor (average years of teaching experience).

These are not results that parents, school administrators, teachers unions, and business groups campaigning for higher spending on public schools want to hear. For example, there was only a 20 percent differential in instructional expenditures per pupil between the highest achieving districts (Manheim Township at $5,375 and Lampeter-Strasburg at $5,377) and the lowest achieving district (Lancaster at $6,441). Much greater differentials are required, increased school funding advocates argue, in order to overcome the multiple disadvantages that Lancaster SD must contend with.

A cautionary note. Significantly increasing resources for disadvantaged children may make little difference. The Dutch educational system spends 90 percent more money per pupil for disadvantaged immigrant children (mostly Turkish, Moroccan, and Surinamese) than it spends on middle-class, ethnic Dutch children. After two decades, the Dutch Board of Audit concluded that there was no evidence that the extra spending had any appreciable impact on the generally low academic performance of disadvantaged minority children when they are segregated in what the Dutch have come to call *schwart* ("black") schools. These Dutch findings generally conform to American findings.[30]

Public and press often characterize school districts as "good school districts" and "bad school districts" by a simple ranking of test scores. The above analysis shows that what basically determines test scores is the socioeconomic status of the

[30] Readers who would like general summaries of such studies may turn to Gary Burtless, ed. *Does Money Matter*? *The Effect of School Resources on Student Achievement and Adult Success*. Brookings Institution Press: Washington, DC (1996).

children enrolled in a school district – a factor over which school boards and school administrators have very little influence (though other local governments do through their planning and zoning policies). A fairer question would be "given the socioeconomic profile of its students, how is a school district doing?

Table 10 arrays the 16 districts by the degree to which their actual results compare to their predicted results according to the five-variable regression analysis. Districts that fall within one standard deviation (plus or minus) of their predicted results are doing what one would expect. Those that fall more than one standard deviation above the predicted level are doing better than expected; those falling more than one standard deviation below the predicted level are doing worse than expected.

Table 10
Predicted vs actual test scores for Lancaster County school districts
Percentage proficient and advanced on 4-year, 3rd, 4th, & 5th grade test battery
(standard deviation = +/- 2.9%)

school district	predicted test score	actual test score	deviation from prediction
	better than predicted		
Lampeter-Strasburg SD	80.2%	84.7%	+4.5%
Hempfield SD	79.2%	82.9%	+3.1%
Solanco SD	78.5%	82.5%	+3.0%
	about same as predicted		
Manheim Township SD	84.0%	85.5%	+1.5%
Eastern Lancaster County SD	78.1%	78.6%	+0.5%
Conestoga Valley SD	77.1%	77.6%	+0.5%
Columbia Borough SD	68.7%	69.0%	+0.3%
Pequea Valley SD	81.7%	81.8%	+0.1%
Ephrata Area SD	77.7%	77.8%	+0.1%
Lancaster SD	**53.8%**	**53.8%**	**0.0%**
Cocalico SD	80.0%	79.3%	-0.7%
Warwick SD	80.7%	80.0%	-0.7%
Elizabethtown Area SD	79.4%	77.9%	-1.4%
	worse than predicted		
Donegal SD	73.1%	69.9%	-3.2%
Manheim Central SD	81.7%	78.4%	-3.3%
Penn Manor SD	82.1%	77.8%	-4.3%

We have highlighted the much-criticized Lancaster SD *because it is actually performing **precisely** at the predicted level.* Want to significantly improve the academic outcomes for Lancaster SD pupils? The next part will analyze the impact of changing the socioeconomic status of their classmates.

Part 4: Influence of Classmates

From analyzing school districts, we turn to analyzing individual schools. The official on-line report cards provided detailed test score information for 71 elementary schools for 2007-08. To maintain consistency of the data base, however, we have set aside ten schools where partial information had been used for other calculations earlier in this report, as follows:

- Fairview ES (Elizabethtown Area SD) and Willow Street ES (Lampeter-Strasburg SD) were too small to report test score data for FARM pupils, (having less than ten in grades 3, 4, and 5 in each case;
- Paradise ES (Pequea Valley SD) covers only K-2 and is not tested;
- Landisville Intermediate Center (Hempfield SD); for this study, we have used Landisville Primary Center, thinking incorrectly that Landisville Intermediate was a middle school; in retrospect, Landisville Intermediate which covers grades 4, 5, and 6 could also have been used; and
- Penn Johns ES (Conestoga Valley SD); Grandview ES and Seller ES (Donegal SD); Caernarvon ES and Summit Valley ES (Eastern Lancaster County SD); and Lincoln ES (Ephrata Area SD) for which (unaccountably) no report cards are posted on the website (although data had been available in previous years.

a. Relationship of socioeconomic status to school performance

Table 11 reports the correlation between a school's socioeconomic composition and test scores.

Table 11
impact of pupil and school factors on test scores

n = 71
adjusted r-square/correlation **= 0.68**
standard deviation = 0.062

dependent (y) variable = average percentage of 3rd, 4th, and 5th grade pupils achieving proficient and advanced on test battery (math and reading) in 2007-08

independent variable	t-stat	significant?	coefficient
pct FARM pupils (grades 3-5)	**-12.27**	yes***	**-0.37**

The correlation for math scores alone (not shown) is 0.67; for reading scores alone (not shown) the correlation is 0.64. The correlation between socioeconomic

status and test scores for the combined battery (as shown in Table 11) is 0.68. This is a strong relationship though it falls short of the correlation of 0.76 cited in the previous section. The main difference is that the earlier calculation combined test scores over four years, thus averaging out a greater degree of randomness than is the case when analyzing scores for just 2007-08 (albeit combining scores in two subject matters over three grades, or six observations).

A correlation coefficient of -0.37 means that for every one percent increase in the percentage of FARM pupils, a school's overall test scores will decrease 0.37 percentage points; conversely, for every one percent decrease in the percentage of FARM pupils, a school's overall test scores will increase 0.37 percentage points.

Table 12 shows the correlation between a school's percentage of minority pupils and its percentage of FARM pupils.

Table 12
Correlation of percentage of minorities to FARM percentage

n = 71
adjusted r-square/correlation **= 0.85**
standard deviation = 0.095

dependent (y) variable = pct of FARM pupils (grades 3-5)

independent variable	t-stat	significant?	coefficient
pct minority pupils (grades 3-5)	**19.88**	yes***	**0.82**

This is a very powerful correlation (0.85) and means that for every one percent change in minority population there will be a 0.82 percent change in FARM population in the same direction. In effect, that's a rough estimate that roughly 80 percent of African American and Latino pupils qualify for FARM.

It is instructive, though, to single out those schools that department by more than one standard deviation from the pattern. Twelve schools have significantly higher percentages of FARM pupils than predicted by their percentages of minority pupils because of the presence of many low-income white pupils: more urban white poor Park ES and Taylor ES (Columbia Borough SD); and rural poor whites in Donegal Springs (Donegal SD), Strasburg ES (Lampeter-Strasburg SD), Burgard ES and Stiegel ES (Manheim Central SD), Salisbury ES (Pequea Valley SD), and Bart-Colerain ES, Clermont ES, Providence ES, and Quarryville ES (Solanco SD).[31]

[31] I have no handy explanation for Fulton ES in the Lancaster School District.

On the other hand, there are also a dozen schools that have significantly fewer FARM pupils than their percentages of minorities would suggest: Fritz ES (Conestoga Valley SD); Centerville ES, Rohrerstown ES, and Landisville Primary Center (Hempfield SD); Elizabeth R Martin (Lancaster SD but located in Lancaster Township); Bucher ES, Neff ES, Nitrauer ES, Reidenbaugh ES, and Schaeffer ES (all in Manheim Township SD); and John R Bonfield ES and KIssell Hill ES (Warwick SD). All are suburban schools located in the Lancaster urbanized area into which middle-class African American and Latino families are moving.

b. Impact of non-FARM classmates on FARM pupil test scores

As groups, middle class pupils (that is, non-FARM pupils) consistently outperform low-income pupils (that is, FARM pupils). For the 71 schools combined, on the math exam non-FARM pupils scored 86 percent and FARM pupils, 71 percent; on the reading exam, non-FAM pupils scored 80 percent and FARM pupils, 60 percent; for the combined battery, non-FARM pupils scored 83 percent and FARM pupils, 65 percent.

That is no news to anyone. But what is the possible effect of varying levels of non-FARM classmates on FARM pupils' test scores? Table 13 summarizes such projected results of just a straightforwardly varying the socioeconomic mix.

Table 13
Effect of percentage of non-FARM classmates on FARM test battery scores

n = 71
adjusted r-square/correlation **= 0.10**
standard deviation = 0.102

dependent (y) variable = battery test scores of FARM pupils (grades 3-5)

independent variable	t-stat	significant?	coefficient
pct of non-FARM classmates (grades 3-5)	**3.03**	yes***	**0.15**

The correlation is very modest (0.10) but still very statistically significant (t-stat of 3.03). The correlation is low in substantial measure because the analysis is dicing the data base into smaller and smaller pieces; thus, the variability becomes greater. For example, there are fewer than 50 FARM pupils (grades 3-5) in 31 of the 71 schools; the lowest number of FARM pupils is 11 in Schoeneck ES (Cocalico SD). Yet, as a data point, how those 11 FARM pupils in Schoeneck ES perform is given equal weight in the regression analysis with how 251 FARM pupils perform in George Washington ES (Lancaster SD).

Conversely, there are fewer than 50 non-FARM pupils (grades 3-5) in 12 of 71 schools (all but Schoeneck ES are in the Lancaster SD); the lowest number is 8 in Carter Macrae ES (Lancaster SD). Yet, as a data point, how those 8 non-FARM pupils perform in Carter Macrae ES is given equal weight in the regression analysis with how 499 non-FARM pupils perform in Hans Herr ES (Lampeter-Strasburg SD). Such disparities in sample size increase variability.

What the analysis shows is that, on average, for every one percent increase in non-FARM classmates, a FARM pupil's test scores will increase 0.15 percentage points. In other words, *on average*, the difference between a low income pupil's attending George Washington Elementary School in the Lancaster School District (a school with 94% low income classmates and only 6% middle class classmates) and that pupil's attending Nitrauer Elementary School in the Manheim Township School District (a school with only 10% low income classmates and 90% middle class classmates) would typically be *a 13 percentage point improvement in the probability that that low-income pupil would achieve proficiency or advanced level in reading and math.*

Such results would not happen overnight, of course, and would certainly not be the result of the FARM pupil's being in smaller classes in Nitrauer ES (pupil-teacher ratio: 17.3) than in George Washington ES (pupil-teacher ratio: 13.7). Nor would it reflect the Manheim Township SD spending more instructional dollars per pupil ($5,575) than the Lancaster SD ($6,441). Over a period of several years, what the improvement would reflect are the benefits of living in a middle class neighborhood in Manheim Township rather than a poverty-impacted neighborhood in Lancaster City and, even more beneficial, being surrounded by middle class children in Nitrauer ES.

Even more dramatic than just the raw benefit of mixing FARM pupils with non-FARM pupils is the benefit of mixing FARM pupils *with non-FARM pupils who are performing at high academic levels*. For every 1% increase in test scores of non-FARM classmates, the average FARM pupil's test scores improved

* 0.47 percentage points in math;

* 0.66 percentage points in reading; and

* 0.62 percentage points for the test battery.

These results are documented in Tables 14, 15, and 16.

Table 14
Effect of percentage of non-FARM classmates' math scores on FARM math scores

n = 71
adjusted r-square/correlation **= 0.13**
standard deviation = 0.105

dependent (y) variable = math test scores of non-FARM pupils (grades 3-5)

independent variable	t-stat	significant?	coefficient
math scores of non-FARM classmates (3-5)	**3.44**	yes***	**0.47**

Table 15
Effect of percentage of non-FARM classmates' reading scores on FARM reading scores

n = 71
adjusted r-square/correlation **= 0.30**
standard deviation = 0.097

dependent (y) variable = reading test scores of non-FARM pupils (grades 3-5)

independent variable	t-stat	significant?	coefficient
reading scores of non-FARM classmates (3-5)	**5.61**	yes***	**0.66**

Table 16
Effect of percentage of non-FARM classmates' battery scores on FARM battery scores

n = 71
adjusted r-square/correlation **= 0.25**
standard deviation = 0.105

dependent (y) variable = battery test scores of non-FARM pupils (grades 3-5)

independent variable	t-stat	significant?	coefficient
battery scores of non-FARM classmates (3-5)	**4.97**	yes***	**0.62**

In other words, the difference between a FARM pupil's remaining in George Washington Elementary where FARM math test scores are 56% (and the five percent of their non-FARM classmates also score 56%) and that pupil's attending Nitrauer Elementary where the nine-tenths of his/her classmates who are non-FARM score 95% should be an 18 percentage point improvement to 74% in math; for reading, from George Washington (FARM

scores = 46%, non-FARM scores 66%) to Nitrauer (non-FARM scores = 85%) should be a 12 percentage points improvement to 58%.[32]

In part, this greater improvement in rubbing elbows not just with classmates who are "middle class" but with "middle class" classmates that are also scoring very high may reflect more effective teaching at the new school. But, as will be shown in the next section, this phenomenon also reflects the fact that the parents of "middle class" classmates at Nitrauer ES, for example, are much farther up the scale of family income and educational attainment than are the parents of "middle class" classmates at George Washington ES, for example.

c. Impact of FARM classmates on non-FARM pupil test scores

To encourage greater economic integration in public schools it would be optimum to report that a rising percentage of FARM pupils in a school has no negative impact on test scores of non-FARM classmates. At first blush, however, that does not appear to be the case, as shown in Table 17.

Table 17
Effect of percentage of FARM classmates on non-FARM test battery scores

n = 71
adjusted r-square/correlation **= 0.28**
standard deviation = 0.077

dependent (y) variable = battery test scores of non-FARM pupils (grades 3-5)

independent variable	t-stat	significant?	coefficient
pct of FARM classmates (grades 3-5)	**-5.25**	yes***	**-0.20**

In other words, for every one percent increase in low-income classmates, the test scores of middle-class pupils go down 0.2 percentage points. If that is what is really going on, any efforts at achieving greater economic integration would be a political non-starter with middle-class parents.

But possible negative effects in the classroom of middle-class pupils having more low-income classmates is not what is really going on. What is

[32] Actual test scores for the ten percent of Nitrauer pupils who are low-income was 66% for math and 57% for reading in 2007-08.

happening is that the "middle class" is not a homogeneous group but continues to sort itself by income and educational attainment.

Recall that, in accordance with US Department of Agriculture instructions for participating in the FARM program, school districts collect income data only for purposes of determining eligibility for free and reduced price school meals. In 2008, the cutoff for eligibility was 185 percent of the nation-wide federal poverty threshold of $21,200 for a family of four; that translates into $39,200 beyond which any pupil was ineligible for subsidized meals (i.e. became "non-FARM").

In 2008 also, the federal Department of Housing and Urban Development (HUD) established the Area Median Income (AMI) for Lancaster County as $64,200 for a family of four. As the median is the mid-point of the income distribution, only 30 percent of Lancaster County's families were eligible for subsidized school meals. That means that "non-Farm" covers the upper 70 percent of Lancaster County families – a vast range indeed.

To get a better grasp of who the non-FARM pupils might be in each school, we have constructed a rough profile of the median income of families with children for each elementary school. The profiles are only approximations, using Census 2000 income data (the latest available on a jurisdiction-by-jurisdiction basis) and treating "attendance zones" on a jurisdiction-wide basis only. Thus, for example, all ten elementary schools located within Lancaster City are treated as having the same attendance zone.

Census 2000 breaks down families with children 18 years or less into three groups: married couples, male headed families (no wife present), and female headed families (no husband present). The income differentials between the three groups are very significant.

Table 18
Median income profiles (in 1999) of different elementary schools grouped by pct FARM

group by FARM pct	no.	non-FARM test score	FARM test score	married couple	single father	single mother
8%-15%	12	86.8%	60.3%	$79,167	$36,390	$33,246
16%-30%	36	85.5%	69.3%	$68,689	$38,264	$29,316
31%-45%	10	83.7%	68.5%	$65,052	$37,071	$25,584
46%-60%	2	79.7%	57.5%	$66,296	$30,535	$20,529
61%-96%	12	73.3%	56.0%	$57,072	$28,950	$19,726

Thus, if we just focused on a school's percentage FARM and test scores of non-FARM pupils in them, we would conclude (as Table 17 seems to demonstrate) that the rising percentage of FARM pupils causes a decline in non-FARM test scores from an 86.8% success rate in the lowest FARM schools to a 73.3% success rate. What becomes clear from the other columns, however, is that the non-FARM/"middle class" population profiles are very different. Median family income for married couples with children was $57,072 in the 12 highest FARM school zones (11 in Lancaster SD, the 12th in Columbia Borough SD) while median family income in the 12 lowest FARM school zones was $79,167 (four in Warwick SD, three in Manheim Township SD). Moreover, median family income reflects parental educational attainment; 26.8 percent of adult Warwick SD residents and 38.8 percent of adult Manheim Township residents are college graduates whereas only 14.0 percent of adult Lancaster City SD are college graduates. Even single parent families are much better off in communities like Warwick and Manheim Townships than in Lancaster City or Columbia Borough.

Thus, "middle class" pupils reflect a wide range of family income and parental educational attainment; income sorting among different schools is extensive among "middle class" pupils and not just a practice resulting in the relative isolation of low-income pupils. Our statistical analysis did show a decline of middle class pupils' proficiency levels as the percentage of low-income classmates increased – an apparent decline (0.20 percentage points) that was greater than the improvement for low-income pupils (0.15 percentage points). However, that apparent decline in middle class pupils' performance reflected the changing composition of the "middle class" in schools with increasingly higher percentages of low-income classmates.[33]

"Middle class" schools with relatively few low-income pupils had higher percentages of children from high income, largely professional households. For example, the six elementary schools in the Manheim Township School District averaged 16% low-income pupils (most of whom would have been members of single-parent families in Manheim Township). For Manheim Township's married couples with school age children, average

[33] School records classify pupils' family incomes into three groups: eligible for free meals, eligible for reduced price meals, and not eligible for subsidized meals. "Low-income" typically covers the lowest 30% of family incomes, and "middle class" covers the higher 70% of family incomes – a very wide income range indeed.

family income was $97,430 and 39 percent of all adults (25 years and older) were college graduates.[34]

In "middle class" schools with larger numbers of low-income pupils, children from more modest "blue collar" households predominated. For example, Ephrata Area School District's four elementary schools averaged 24% low-income pupils. For the Ephrata area (Akron and Ephrata boroughs and Clay and Ephrata townships), the average income of married couples with school age children was $61,000 and 15 percent of all adults were college graduates.

From truly "low-income" schools, the middle class has largely disappeared. The ten elementary schools located within Lancaster City averaged 86% low-income pupils.[35] Married couples with children living in the city averaged $51,884 (lowest in the county); however, a majority of public school pupils came from one-parent families (male, single parent average income: $25,537; female, single parent average income: $19, 121). The percentage of college graduates was 14%, but perhaps more telling, 33% of adults had not graduated from high school. Though 93% of all elementary school aged city children (k-8) attended city public schools, a high percentage of children from higher income/educational attainment families undoubtedly attended private schools (such as the Montessori Academy, the New School, Resurrection and Sacred Heart) or were enrolled in "city" schools located in Lancaster Township (Burrowes, Elizabeth R Martin, James Buchanan).

That was most likely the primary contributing factor to the apparent decline in "middle class" test scores and any directly adverse effect of having more low-income classmates within the classroom being minimal. Local performance levels never dropped below 70% of middle class pupils' achieving advanced and proficient levels under any socioeconomic circumstances in Lancaster County except within six city elementary schools

[34] Income and educational attainment statistics are drawn from Census 2000, the last census survey that reported on each of Lancaster County's 60 cities, boroughs, and townships.

[35] I am excluding Thomas H Burrowes, Elizabeth R Martin, and James Buchanan elementary schools that are part of the Lancaster School District but are physically located within neighboring Lancaster Township. They do appear to enroll substantial numbers of "city" children because their FARM percentages (78%, 52%, and 61%, respectively) are too high for the socioeconomic levels of the township's own families (average family income of married couples with children was $80,708; 31% of adults were college graduates). The township's own single-parent families (512) could have provided only about one-third of the three schools' FARM pupils.

whose "middle class" was mostly composed of pupils from families with very modest incomes and parental educational attainment.

This last analysis of the diversity of income groups and parental educational attainment within the 70 percent of Lancaster County society that is "non-FARM" raises the question of the degree to which similar diversity exists the 30 percent of Lancaster County society that is "FARM." Clearly, some such diversity exists. That is evident from Table 18 for the majority of FARM pupils probably are members of single-parent families. However, how much the apparent positive results of mixing FARM with non-FARM children are attributable to such mixed-income classrooms and how much may be attributable to the distribution of somewhat less disadvantaged FARM pupils cannot be determined from publicly available data on Lancaster County's schools. Other, more carefully controlled research of the benefit of economically diverse classrooms on low-income children does show significant positive effects.

Finally, Table 18 illustrates another well-documented phenomenon: a socioeconomic "tipping point" for neighborhoods and, hence, neighborhood schools. The distribution of schools according to socioeconomic status does not follow a normal bell curve distribution with the largest number of schools being in the mid-range of the income scale; it assumes a barbell shape with 48 low-poverty schools (0-30% FARM) grouped at one end, another grouping of 12 high-poverty schools (61-100% FARM) at the other end, and relatively few (12) medium poverty schools (31-60% FARM) in the middle, including only two schools in the 46-60% FARM category.[36] Past some threshold, middle class families either opt out of the neighborhood or opt out of the public school.

Summary: These scholastic patterns reflect the reality that classmates are also playmates. Lancaster County's schools are quintessential neighborhood schools. Whatever may be transfer policies may be within the 16 school districts, there are no *inter-district* transfer policies. Where a child lives largely shapes his educational opportunities – not because of what the school board does but because of who his classmates are. **Housing policy *is* school policy.**

[36] Corresponding data for the Baltimore metro area in 2003 were 201 schools in the 0-30% FARM category, 109 schools in the 61-100% category, and only 63 schools in the 31-60% FARM category (many of which were in transition from lower to higher FARM status.

Appendix A

The most comprehensive review of the effect of socioeconomic integration of public schools is Richard D. Kahlenberg. *All Together Now: Creating Middle-Class Schools through Public School Choice.* Brookings Institution Press: Washington, DC. (2001). Kahlenberg's 33 pages of footnotes to chapters 3 and 4 catalogue most major studies on the effects of racial and economic school integration.

Kahlenberg writes (p. 26) that "thirty-three years later [i.e. in 1999], *Education Week* noted that the Coleman Report was still 'widely regarded as the most important education study of the twentieth century' and that Coleman's finding 'that a school's socioeconomic background is a strong determinant of its students' achievement' continues to be validated in education studies. Dozens of studies before and after the Coleman Report have come to similar conclusions.'"[37]

I myself have done many such studies not to prove once again to the research community what has been demonstrated time after time by education researchers more skilled than I but to demonstrate to specific client communities how students' socioeconomic status is central to their own local school systems and their results. My findings regarding the correlation between socioeconomic status and standardized test score results from such studies can be summarized, as follows:

- 0.77 for each school's percentage of students that achieved proficient and advanced levels on 3rd, 4th, and 5th grade reading, writing, and math tests of the Colorado School Assessment Program (CSAP) for 2000, 2001, and 2002 in all 391 public elementary schools in metro Denver's 17 school districts.
- 0.74 for the 4th grade battery of Connecticut Mastery Tests (CMT) for all 518 elementary schools in 149 school districts in the state of Connecticut in 2000–01; the correlation between CMT scores and five "school-based" independent variables (average class size, pupil-staff ratio, average years of teacher experience, percentage of teachers with Master's degrees, and percentage of non-certified teachers) was 0.04.
- 0.87 for 4th grade test scores for 22 elementary schools in the Alachua County Public Schools (Gainesville, Florida) in 1994–96;

[37] Kahlenberg's footnote to that single sentence cites 23 different studies

the correlation between test scores and three "school based" independent variables (expenditures per pupil, average class size, and percentage of teachers with more than ten year's experience) was 0.46, seemingly very explanatory as well until one realizes that spending more per pupil and smaller class sizes were *negatively* related to pupil performance. (Clearly, with federal aid targeted on low-income pupils, greater spending and smaller classes were simply proxies for the pupils' low socio-economic status.)

- 0.65 for 3rd grade test scores at 51 elementary schools in 1991 and 0.62 for 3rd and 4th grade test scores at 61 elementary schools in 34 school districts in the three-county Peoria-Pekin, Illinois area in 1996.
- 0.85 for the battery of ISTEP tests for all grades in 16 Lake County, Indiana (Gary-Hammond-East Chicago) school districts (plus statewide averages) in 1998–99; and 0.85 for percentage of students achieving math and English standards in 1998–99; and 0.89 for SAT scores in 1998–99. The correlations between two school-based "inputs" (expenditures per pupil and average teacher salary) and these three academic "outputs" were -0.09, -0.09, and -0.05 (all *negatively* related so they were proxies for socioeconomic status as well).
- 0.81 for three-year average composite results of 2nd and 4th grade math and reading scores on the Comprehensive Test for Basic Skills in 373 elementary schools of the seven school districts of Baltimore, Maryland in 2000–02.
- 0.82 for three-year average composite results of 2nd and 4th grade math and reading scores on the Comprehensive Test for Basic Skills in 125 elementary schools of the Montgomery County, Maryland Public Schools (the 13th wealthiest county in our nation) in 2000–02.
- 0.82 for three-year average composite results of 2nd and 4th grade math and reading scores on the Comprehensive Test for Basic Skills in 125 elementary schools of the Montgomery County, Maryland Public Schools (the 13th wealthiest county in our nation) in 2000–02.
- 0.50 for four-year average composite results of 4th and 5th grade reading, writing, math, and science exams of the Michigan Educational Assessment Program (MEAP) at 483 elementary schools in an 18-county area of southwestern Michigan from 1994 to 1998. That region of the state included many schools in farming

communities where nominal family cash incomes were low (thereby qualifying more children for subsidized meals) but parental educational attainment was relatively high. (That same phenomenon was at work in farming communities of the three-county Peoria-Pekin, Illinois area. Children from family-owned farms score higher than their family's income level would predict if they were from urban settings.)

- 0.75 for eight-year composite results for 3rd graders and 0.78 for eight-year composite results for 5th graders on the Iowa Test of Basic Skills battery in 78 elementary schools of the Albuquerque, New Mexico Public Schools from 1983–84 to 1991–92.
- 0.77 for three-year average pass rate of 4th graders on a five-test battery at 110 elementary schools in the three-county Toledo, Ohio area from 1999–01. The correlation between two school-based "inputs" (total expenditures per pupil and average teacher salary) and academic "output" was 0.41, which implies successful strategic deployment of scarce public resources; however, higher per pupil expenditures were negatively associated with test scores and greater proportions of low-income pupils were associated with lower teacher salaries.
- 0.67 for two-year averages in 5th grade math and reading scores for 43 elementary schools (in 16 school districts) of York County, Pennsylvania in 2000–02.
- 0.66 for three-year averages on the Texas Academic Achievement System (TAAS) tests for 189 school districts in the five largest metro areas of Texas (Austin, Dallas, Fort Worth, Houston, and San Antonio) in 1994–97.
- 0.75 for three-year averages for achieving Advanced and Proficient (A & P) thresholds on the five-test battery for 4th graders in 60 elementary schools in Dane County (Madison) Wisconsin in 1999–01. At the level of the 16 school districts, the correlation between the district's percentage of low-income pupils and A & P-level performance was -0.67; the correlation between test performance and two school-based inputs (education cost per pupil and pupil-teacher ratio) was -0.18. The association of higher expenditures per pupil and smaller class sizes with lower test performance demonstrates again that more money and smaller class sizes flow towards lower-income pupils because of federal mandates for education aid.

- 0.80 for four-year averages in achieving Advanced and Proficient (A & P) thresholds in 3rd and 4th grade reading at 43 elementary schools in eight school districts in Brown County (Green Bay), Wisconsin in 2000–04.
- and now 0.68 for the combined battery of math and reading tests for 3rd, 4th, and 5th grade test takers in 71 elementary schools in Lancaster County, Pennsylvania in 2007-08.

The second major finding of James Coleman's monumental study four decades ago was that *poor children learn best when surrounded by middle-class classmates.* My own studies of several metro areas have shown that:

- In an Albuquerque study of 1,108 individual pupils, the average pupil from a public housing household increased Iowa Test of Basic Skills scores by 0.22 percentile points for every one percent increase in middle class classmates (Rusk and Mosley 1994); the difference between a public housing child's attending Cochiti Elementary (80 percent low-income classmates) and that child's attending John Baker Elementary (80 percent middle-class classmates) would be, on average, a 13 percentile improvement in the child's ITBS ranking;
- In a study of 373 elementary schools in metropolitan Baltimore, for every one percent increase in middle class classmates, a low-income pupil's scores improved, on average, 0.18 percentile points on the Comprehensive Test of Basic Skills (Rusk 2003). The difference between a low-income pupil's attending Mosher Elementary in Baltimore City (80 percent low-income classmates) and that child's attending Rivera Beach Elementary in Anne Arundel County (80 percent middle-class classmates) would be, on average, an 11 percentile improvement in the child's CTBS ranking;
- In a study of 186 school districts in the five largest metro areas of Texas, for every one percent increase in middle class pupils, low-income pupils increase their chances of achieving a passing rate on the Texas state exams (Texas Assessment of Academic Skills, or TAAS) by 0.27 percentage points (Rusk 1998); the difference between a low-income child's attending a typical elementary school in the Southside Independent School District (80 percent low-income classmates) and a typical elementary school in suburban Alamo Heights Independent School District (80 percent

middle-class classmates), on average, would be a 16 percentage point improvement in their chances of achieving a passing rate in TAAS; and

- In a study of 60 elementary schools in Madison-Dane County, for every one percent increase in middle class classmates, the average low-income 4th grade pupil's likelihood of achieving Advanced or Proficient levels on the state WINSS tests improved 0.64 percentage points in reading; 0.50 percentage points in language; 0.72 percentage points in math; 0.80 percentage points in science; and 0.74 percentage points in social studies (Rusk 2002). In other words, the difference between a low-income pupil attending a school with only 45 percent middle class classmates (e.g., Lincoln or Mendota) and that pupil attending a school with 85 percent middle class classmates (e.g., Crestwood or Northside) would typically be a 20 to 32 percentage point improvement in that low-income pupil's probability of achieving A & P thresholds.

These studies have assessed the benefits of socioeconomic integration at the level of individual students (the Albuquerque study) or individual elementary schools (the Baltimore and Madison studies) to entire school districts (the Texas study). To these can now be added the Lancaster County study (at the level of individual elementary schools) whose findings are (for easy comparison with the four studies summarized above):

For every 1% increase in middle class classmates, the average low-income pupil's test scores improved

* 0.15 percentage points in math; and, equally,

* 0.15 percentage point in reading.

In other words, the difference between a low income pupil's attending George Washington Elementary School in the Lancaster School District (a school with 94% low income classmates and only 6% middle class classmates) and that pupil's attending Nitrauer Elementary School in the Manheim Township School District (a school with only 10% low income classmates and 90% middle class classmates) would typically be *a 13 percentage point improvement in the probability that that low-income pupil would achieve proficiency or advanced level in reading and math.*

And even more dramatic than just the raw benefit of mixing low-income pupils with middle class pupils is the benefit of mixing low income pupils *with middle class pupils who are performing at high academic levels*. For every 1% increase in test scores of middle class classmates, the average low-income pupil's test scores improved

* 0.47 percentage points in math; and

* 0.66 percentage points in reading.

In other words, the difference between a low-income pupil's remaining in George Washington Elementary where low-income math test scores are 56% (and the five percent of their "middle-class" classmates also score 56%) and that pupil's attending Nitrauer Elementary where the nine-tenths of his/her classmates who are middle class score 95% should be an 18 percentage point improvement to 74% in math; for reading, from George Washington (low-income scores = 46%, "middle class" scores 66%) to Nitrauer (middle-class scores = 85%) should be a 12 percentage points improvement to 58%.[38]

In short, the Lancaster County findings fall squarely both within the mainstream of educational research and within the range of findings of my own studies.

In fact, there have been no more consistent findings of educational research over the past four decades than

1) the socioeconomic status of a child's family and (almost co-equally the socioeconomic status of the families of a child's classmates are the primary determinants of educational outcomes; and

2) (though less studied), poor children learn best when surrounded by middle class classmates.

Why, then, if there have been no more consistent findings of educational research than these, do such findings seem so "new" to many local audiences? Why does the Congress enact a No Child Left Behind Act when any researcher, using the Common Core of Data of the National

[38] Actual test scores for the ten percent of Nitrauer pupils who are low-income was 66% for math and 57% for reading in 2007-08.

Center for Education Statistics, could have predicted what would be found to be "failing schools" within 24 hours of the new federal law's passage?

It is because there have been no findings of educational researchers more consistently – I would say, even deliberately – ignored by almost all politicians and many, many professional educators because they will not deal with the underlying racial and economic segregation of American society.

- Most politicians because they have predominantly middle-class constituencies that are content with the view that the problems of "those people" ought properly to be solved "over there."

- Many, many educators either

  1] because embracing these findings could well mean less money for their school districts, teacher's union members, etc. (the bad reason); or

  2] because they must do the best job they can with the children they have in their classrooms right now (the good reason).

As, indeed, they must and, as citizens and parents, we must applaud their commitment.

However, we do not have to believe that "every child can learn *regardless of circumstances*" for our society's public policies have shaped negative, education-defeating circumstances for too many children. We have a responsibility to change those circumstances.

Many have said to me "a housing strategy to create economically integrated neighborhoods [and, hence, economically integrated neighborhood schools] *would just take too long*."

I have been doing these housing-school linkage studies for almost twenty years. If many communities had implemented a "housing policy is school policy" program twenty years ago, school outcomes for today's low-income children would be substantially improved.

And, indeed, many of their parents would no longer be low-income.