HOUSING POLICY
IS
SCHOOL POLICY

An Analysis of the Interaction of Pupil Demographics and Academic Achievement in the Baltimore County Public Schools

Final Report
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Prepared for

BRIDGE

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SUMMARY OF FINDINGS

An analysis of enrollment trends within 104 Baltimore County public elementary schools shows that

- The proportion of low-income pupils (that is, FARMS[1] pupils) has grown steadily from 36% FARMS to 52% FARMS over the past decade (as it has in all Baltimore area school districts).
- However, as is true of federally-subsidized housing, the distribution of FARMS pupils is very uneven; for example, the percentage of FARM pupils in District 3 (North County) elementary schools averages 23% while the average in District 7 (Southeast County) elementary schools is 72%.
- The family economic status of its pupils has a profound effect on a school's standardized test score outcomes; in fact, a school's FARMS percentage accounts for (that is, correlates with) *a very, very high 83.5%* of the variation in test scores among the 104 county elementary schools.
- Although other factors individually, such as mobility, percentage of "advanced professional" teachers, and race – though *not* pupil-teacher ratio – correlate to a lesser degree with test scores than FARMS, these other factors' influences almost totally vanish when analyzed in combination with FARMS percentage. The FARMS percentage dominates all other factors.

Other research has shown

- That, in general, family economic status of students' classmates has an even more important impact on students' test scores than the economic status of students' own families; and
- research into both the Baltimore area schools and many studies elsewhere have also shown that low-income children learn best when integrated into middle class (that is, low FARMS) schools; indeed, economic integration, a "community-based" factor, is a more powerful intervention in raising low-income pupils' test scores than any "school-based" factor.

In short, where a child lives powerfully shapes the quality of a child's educational experience not so much in terms of school-based factors (e.g. expenditures per student, student-teacher ratio, teacher qualifications, etc.) but in terms of the socioeconomic status of the child's classmates (who are also, hopefully, playmates).

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[1] pupils whose low family incomes qualify them for **F**ree **A**nd **R**educed-price **M**eal**S**

INTRODUCTORY COMMENTS

To examine the relationship between neighborhood housing patterns, neighborhood school enrollments, and academic outcomes, I have examined data on 104 public elementary schools in Baltimore County. I focused on elementary schools, because

a) elementary school attendance zones most closely reflect what are commonly seen as neighborhoods (as contrasted, for example, with high school attendance zones which are geographically much broader and cover multiple neighborhoods);

b) research shows that a student's basic skill levels are substantially developed in the elementary school years and show little significant change thereafter;

c) a key socioeconomic indicator, eligibility for FARMS, is most accurately reflected at the elementary school level;[2] and

d) analyzing 104 elementary schools rather than 28 middle schools or 25 high schools produces more statistically significant results.

Several additional observations:

a) Eligibility for FARMS is not limited to students from families that are officially "poor" (that is, that fall below the federally-established poverty threshold). Nationwide, students from families with up to 130% of the federal poverty threshold qualify for free meals and up to 185% of the federal poverty threshold qualify for reduced-price meals (on a sliding scale). These are nationwide standards regardless of differences in regional cost-of-living. Thus, if anything, the FARMS percentage is over-counted for lower cost-of-living regions and under-counted for higher cost-of-living regions (such as Baltimore). For 2015-16 the federal poverty threshold for a family of four is $24,250; to qualify for free meals, up to $31,525; to qualify for reduced-price meals, up to $44,863.

[2] Nationwide, FARMS percentages at the high school level are lower than at the elementary or middle school level. In 2015-16, Baltimore County's the average FARMS percentage for Baltimore County's 104 elementary schools was 51.6% as compared with 43.5% for its 25 high schools. Lower FARMS rates in high schools probably reflect a) slightly higher family incomes as working parents progress to more senior wage levels through the years to which may be added b) earnings of high school students themselves in after-hours and weekend jobs. Moreover, some otherwise income-eligible high school students may forego FARMS because they do not want to stigmatize themselves in the eyes of better-off classmates. In addition, some seniors may prefer to lunch off-campus under "open-campus" policies (though I find no evidence of such policies within Baltimore County high schools.

For the Baltimore metro area the *national* upper income limit to qualify for FARMS ($44,863) almost exactly matches the *regional* upper income limit ($44,800) to qualify for federal Housing Choice Voucher (HCV) and other forms of federal housing assistance. Translating FARMS income limits into the average annual wages/salaries of different occupations[3] yields

Reduced-price meals ($31,526-$44,863)

Police, fire, and ambulance dispatchers (i.e. 911 operators); bookkeeping, accounting and auditing clerks; automotive service technicians and mechanics; emergency medical technicians and paramedics; secretaries and administrative assistants (except legal, medical, and executive); medical secretaries; customer service representatives; light truck or delivery services drivers; medical assistants

Free meals ($31,525 or less)

Office clerks (general); preschool teachers (except special education); nursing assistants; receptionists and information clerks; security guards; restaurant cooks; teacher assistants; home health aides; personal care aides; janitors and cleaners (except maids and housekeeping cleaners); stock clerks and order fillers; retail salespersons; child care workers; fast food cooks; cashiers

Thus, rather than FARMS recipients being characterized as "poor," a more neutral term of "low income" embraces school children of a great many working people who are essential for the functioning of the local economy and community life.

b) In Maryland publicly available data sources do not distinguish between fully subsidized and partially subsidized FARMS students. From other studies I've found that reduced-price meal students (i.e. from higher up the low income scale) outperform academically free meal students (i.e. from further down the low income scale). Elsewhere, reduced price students are about 15-20% of the total FARMS population. There's no reason to believe that Baltimore County would be different.
c) Finally, unless otherwise indicated, all data are compiled from the 2015-2015 school-by-school, on-line report cards assembled by the Maryland State Department of Education (MSDE).

The following sections will document the six findings summarized above from this study or provide examples of other regional and national research substantiating them.

[3] This assumes that a worker in these occupations is the sole breadwinner for a family of four.

The proportion of Baltimore County's low-income students has grown steadily from 36% FARMS to 52% FARMS over the past decade.

Table 1 summarizes trends from 2004 to 2015 in all Baltimore area school districts.

Table 1 – FARMS percentage 2004 to 2015
by school district

School district	2004	2015
Baltimore County	**35.9%**[4]	**51.9%**
Anne Arundel County	22.2%	38.1%
Baltimore City	81.2%	89.4%
Carroll County	10.4%	25.1%
Harford County	23.4%	35.5%
Howard County	10.2%*	23.0%
Queen Anne's County	17.1%	30.5%
Baltimore metro area (7 districts)	41.9%	49.8%

*Howard County data for 2005

Part of the increase in FARMS in suburban school districts is attributable to Baltimore City's declining population overall and of school children. From the 1990 census to the 2010 census Baltimore City's population dropped by almost one-sixth from 736,014 to 620,961. According to MSDE records, over a roughly comparable span (1997-2015) city elementary school enrollment dropped by almost one-third. Presumably most did not move out of the entire region but into suburban areas, particularly into Baltimore County, Anne Arundel County and Howard County.

Though the Baltimore regional economy has performed better than the national economy, income stagnation for middle- and low-income families has also raised FARMS eligibility.[5] (The increase in FARMS in Queen Anne's County elementary schools, which probably received few families relocating from Baltimore City and its

[4] From my 1997 study of the Baltimore County public schools for the Abell Foundation (also based on state report cards), the FARMS percentage in county elementary schools was 30.4%.

[5] From 1989-2013, adjusted for inflation, real median family income increased on 8% compared with 18% during the 1970s and 1980s, and 104% (that is, doubling) in the first two post-World War II decades.

inner suburbs, would be some measure of that effect.) Stagnating or declining incomes would have hit particularly hard female heads of households with children (who were 62% of all poor families in 1989).

The distribution of FARMS pupils is very uneven.

Table 2 charts the distribution of FARMS pupils among the county's elementary schools sorted by county commission districts.

Table 2 – FARMS percentage (unweighted means) from 1994 to 2015 by county council district

Council district	1994*	2004	2015
1	29%	41%	59%
2	16%	25%	43%
3	7%	12%	23%
4	43%	48%	68%
5	10%	15%	27%
6	37%	49%	63%
7	44%	53%	72%

*Data from my 1997 study based on MSDE report cards

Thus, elementary schools in county council districts 3 and 5 have the lowest percentage of FARMS pupils, those in districts 2 and 1 are in the FARMS mid-range, and those in 6, 4, and 7 are in the FARMS upper range.

But these county council district wide summaries obscure significantly skewed FARMS distribution within a district's elementary schools. For example, let's label schools with 1-20% FARMS as low FARMS; 21-40%, low-middle FARMS; 41%-60%, high-middle FARMS; 61%-80%, high FARMS; and more than 81% as hyper FARMS schools.

Table 3 lists elementary schools within Council District 3 (North County).[6]

[6] Similar tables for all council districts are provided in Appendices A-1 to A-7. In addition to changes in FARMS percentages, these tables include the percentages of pupils meeting or exceeding expectations on standardized English/language arts and math (PARCC) tests in 2015.

Table 3 – FARMS percentage from 1994 to 2015
for elementary schools within county council district 3

elementary school	1994	2004	2015
Sparks	4%	<5%	<5%
Jacksonville	3%	<5%	6%
Carroll Manor	3%	5%	7%
Prettyboy	5%	<5%	7%
Pinewood	1%	<5%	8%
Seventh District	7%	7%	9%
Timonium	7%	<5%	11%
Fifth District	5%	<5%	13%
Lutherville Laboratory	5%	8%	16%
Hampton	9%	12%	19%
Mays Chapel*	na	na	29%
Pine Grove	4%	18%	37%
Warren	11%	19%	44%
Pot Spring	11%	17%	47%
Padonia International	22%	27%	67%

*Mays Chapel Elementary School was established in 2014.

Thus, by the criteria set forth above ten of North County's 15 elementary schools are low FARMS (and seven of the ten experienced virtually no increase in FARMS over the two decades); two schools (Mays Chapel and Pine Grove) are low-middle FARMS; two (Warren and Pot Spring) are high-middle FARMS; and Padonia International is high FARMS. In fact, it is only the presence of Padonia International that boosts the (unweighted) FARMS average for all North County's elementary schools slightly above the 20% (low FARMS) threshold.

District 5 (Northeast County) has a somewhat similar school profile to District 3. At the other extreme, District 4 (West County), District 6 (East County) and District 7 (Southeast County) each have eleven high poverty schools and to that number District 7 adds four hyper-FARMS schools.

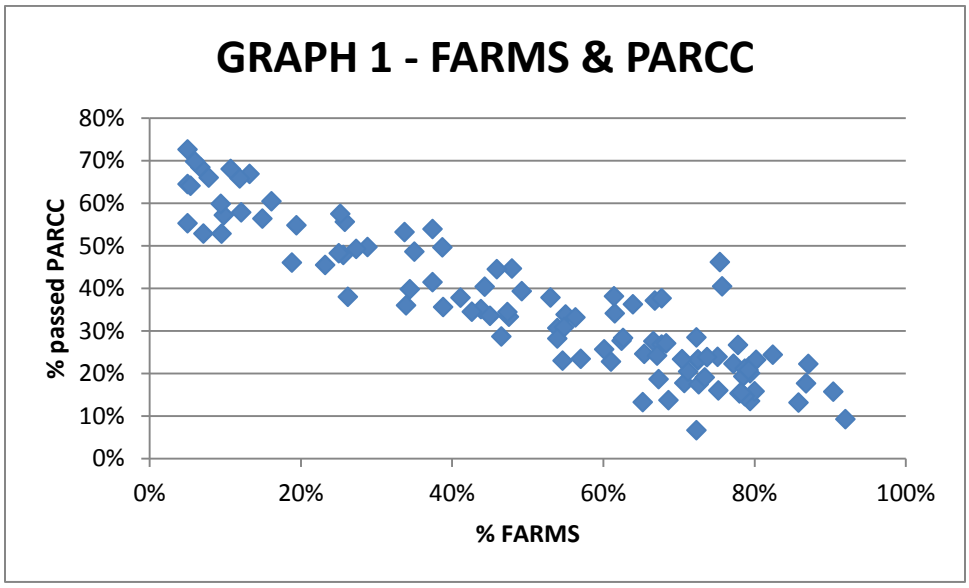
The family economic status of its pupils has a profound effect on a school's standardized test score outcomes.

Maryland's public elementary school instituted new standardized tests in 2015-16, the nationwide PARCC tests (**P**artnership for **A**ssessment of **R**eadiness for **C**ollege and **C**areers). At the elementary school level pupils in 3rd, 4th and 5th grades were tested in math and English Language Arts/Literacy. Based on their results pupils

were assessed as performing at Level 1 ("did not yet meet expectations); Level 2 ("partially met expectations"); Level 3 ("approached expectations"); Level 4 ("Met expectations"); and Level 5 ("exceeded expectations"). Levels 4 and 5 seem to correspond most closely to the former standards of "proficient" and "advanced" that MSDE treated as having "passed" the former system of standardized tests so I have focused on Levels 4 and 5results as indicating "passing" PARCC as well.

What is the impact of the economic composition of an elementary school's pupils on PARCC test scores? Examining the District 3 (North County) summary in appendix A-3 with PARCC passing scores added, one sees that the nine elementary schools with from 5%-16% FARMS range between 60% and 70% pass rates with the exception of underperforming Prettyboy Elementary (53%). By contrast, with 63% FARMS Padonia International has only a 28% passing rate.

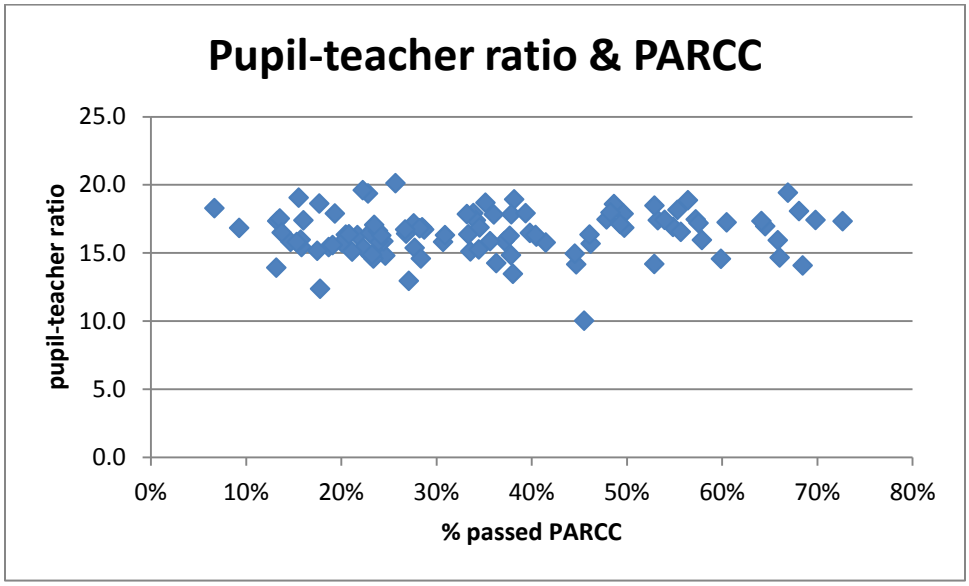
Eyeballing the summary results for all 104 elementary schools in the seven county council districts (i.e. appendices A-1 to A-7) would show the same pattern. In fact, that is just what Graph 1 does.



The schools with the lowest FARMS rates (horizontal axis) have the highest PARCC passing rates (horizontal axis); conversely, the schools with the highest FARMS rates have the lowest PARCC passing rates. One can imagine a straight line drawn from the top left hand corner (low FARMS/high PARCC pass rates) to the bottom right corner (high FARMS/low PARCC pass rates) and see that most of the 104 individual schools cluster very close to that line. The most striking exceptions (or "outliers") would be "over-performing" Chadwick (75% FARMS; 46% PARCC) and Berkshire (76% FARMS; 40% PARCC) and severely "underperforming" Edmondson Heights (72% FARMS; 7% PARCC). Thus, FARMS rates and PARCC rates seem to be highly interrelated, or "correlated,"

with each other. Move up and down that imaginary line that fits best among all the points and, knowing a school's FARMS rate, one can estimate its PARCC pass rate with a high degree of accuracy.

An example where there is no correlation, or "fit," between two factors is shown in Graph 2. Here the two factors are each school's PARCC passing rates (horizontal axis)[7] and each school's pupil-teacher ratio (vertical axis).[8]



Contrary to conventional wisdom, there is no correlation between pupil-teacher ratio and test scores. Having a lower pupil-teacher ratio (i.e. smaller class sizes) does not necessarily lead to higher test scores. That imaginary line best fitting through the highly scattered points would be almost completely horizontal (and probably right at about a 16.5 pupil-teacher ratio). The disparities in pupil-teacher ratio are fairly great, in all but one case ranging from Battle Grove (12.4 p-t ratio; 18% PARCC) to Seneca (20.1 p-t ratio; 60% PARCC). Just knowing a school's pupil teacher-ratio does not allow any vaguely accurate estimate of its PARCC passing rates. Indeed, the real outlier, Chadwick (10.0 p-t ratio) has only a slightly better than average PARCC passing rate (45%).

These graphic representations of the relationship between two factors can be more precisely expressed by using linear, least squares regression analysis. If a given change in factor A is *always* associated with a specific value of factor B, the

[7] There is no mathematical consequence to placing % passing PARCC on the vertical axis (Graph 1) or the horizontal axis (Graph 2). I switched them simply to present two graphs that would be easy to compare visually.

[8] Each school's on-line profile provides both total enrollment and number of teachers from which I calculated pupil-teacher ratios.

"correlation" (i.e. r-square) would be 1.0. The correlation between FARMS and PARCC passing rates for Baltimore County's 104 elementary schools is 0.835 – very, very strong. The correlation between pupil-teacher ratio and PARCC passing rates is 0.0099 – in effect, non-existent.

For this study I regressed *individually* every factor available on the MSDE report cards for each elementary school (the *x*, or "independent variables") with the composite results of Levels 4 and 5 on the math and English Language Arts/ Literacy tests for 3rd, 4th, and 5th grades (the *y*, or "dependent variable"). The technical results are contained in Appendices B-1 and B-2, but in terms of strength of relationship the different factors and their positive or negative impact are listed in Table 4. ("Positive" means both change in the same direction – i.e. as the *x* variable increases, the *y* variable (test scores) increases; "negative" means that they change in opposite directions.)

Table 4 – Relative strength of different factors on PARCC scores

Factor	strength	direction
% FARMS	very, very strong	negative
% mobility (classroom turnover)	strong	negative
% advanced professional teachers[9]	strong	positive
% White pupils	strong	positive
% Black pupils	moderately strong	negative
% Hispanic pupils	weak	negative
% special education pupils	weak	negative
% Asian pupils	very weak	positive
pupil-teacher ratio	none	positive #
% classes taught by not highly qualified teachers	none	positive #

NOTE: # not statistically significant

However, how do these factors interact with each other? For instance, the top two factors both have a negative impact on PARCC scores – % FARM and % mobility.

[9] Per MSDE definition: "The Advanced Professional Certificate requires three years of satisfactory professional school-related experience, and a master's degree or a minimum of 36 semester hours of post baccalaureate course work."

Yet regressing them against each other produces a correlation of 0.730 (very strong) with a positive sign – the higher the percentage of FARMS, the higher the classroom turnover within a school year. And that stands to reason, given the constant residential churning of many low-income families from, for example, a rental property to being evicted for not meeting the rent when the parent loses a job to staying with friends or family until they get back on their feet to another rental property, etc. – all of which may be in different elementary school attendance zones.

Though there are many poor White children, the great majority is not poor. Thus, the correlation between % White and % FARMS is 0.471 and negative – i.e. the higher the % White, the lower the % FARMS. Conversely, the reverse is true for Blacks with a correlation with FARMS of 0.370 and positive.

I am struck by a different set of relationships: the correlation between % advanced professional teachers and % FARMS is a negative 0.420 and with % Black the correlation is a negative 0.263. In combination, the correlation with % advanced professional teachers is a negative 0.442. Thus, the common complaint that schools with large numbers of poor Black pupils don't get the more experienced teachers is borne out statistically. Yet the correlation between % advanced professional teachers and % mobility is almost equal – a negative 0.432. Table 5 summarizes the distribution of % advanced professional teachers among % mobility gtoupings.

Table 5 – Mobility & Advanced Professional Teachers

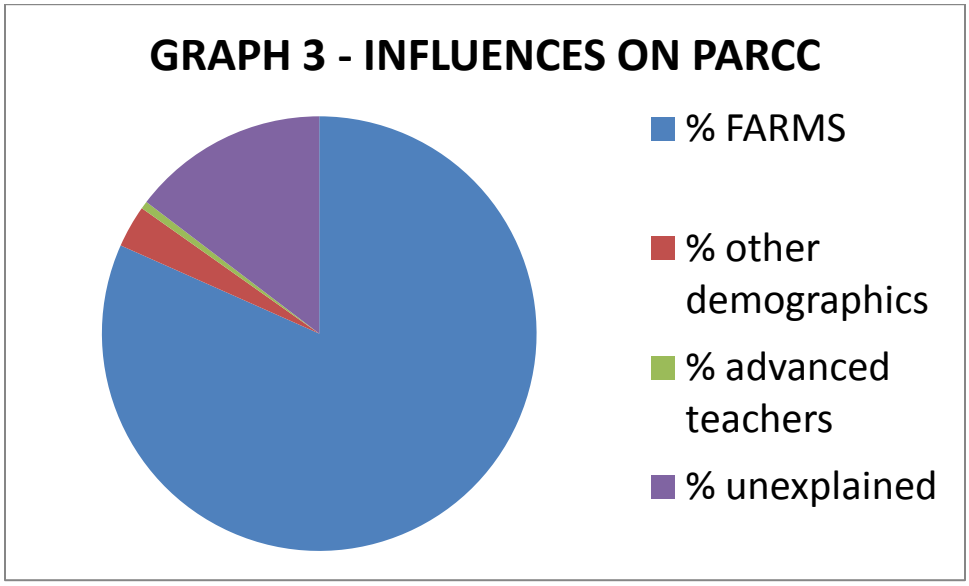
Mobility range	% advanced teachers
<5.0% - 9.9%	83%
10.0% - 15.9%	72%
16.0% - 20.9%	68%
21.0% - 24.9%	61%
25.0% - 47.6%	52%

A teacher in a high FARMS/high mobility school, on average, finds at the end of the school year that from a quarter to almost a half of the pupils in June are not the pupils the teacher started with in September. I find it hard to fault that teacher who, after a number of such years, decides to accept an opening in a low mobility school where the teacher has a chance to truly teach a more stable group of pupils. Indeed, it is admirable that over half the teachers in the highest mobility schools still are "advanced professional teachers."

To answer definitively the above question ("how do these factors interact with each other?") I've carried out a multi-variate, linear regression in which the dependent

variable (*y*) continues to be % PARCC passing rate and eight statistically significant independent variables on the previous page (that is, excluding pupil-teacher ratio and % classes taught by not highly qualified teachers) are variables *x*1 through *x*8. The combination of all factors raises the correlation to 0.854 but the only statistically significant variable individually is % FARMS; all the others, in effect, are absorbed and largely canceled out by the presence of % FARMS. In other words, for example, race doesn't matter; the issue is economic status.

Graph 3 visually depicts the results. % FARMS is 81.7% of the explanatory[10] factors and other pupil demographics (i.e. race, mobility, special education) contribute another 3.1%. The % advanced professional teachers accounts for only another 0.6% while 14.6% of the school-by-school variations in PARCC test scores



remains unexplained. Being able to average several years of PARCC results and accompanying demographic factors would further shrink the unexplained portion, but perhaps for about 5% there would never be an explanation.[11]

[10] Statisticians caution that "correlation is not causation but it sure is a hint." Per Wikipedia a famous example (that appeals particularly to me) of two factors that had a high degree of correlation, but … is "the result of the last home game by the Washington Redskins prior to the presidential election predicted the outcome of every presidential election from 1936 to 2000 inclusive, despite the fact that the outcomes of football games had nothing to do with the outcome of the popular election. This streak was finally broken in 2004 (or 2012 using an alternative formulation of the original rule)." However, these elementary school correlations provide more than just a "hint" of causation. There are multiple statistical studies plus real world observations that validates the overwhelming impact of "who the kids are" on school outcomes.

[11] A 1994 study that I did of the Albuquerque Public Schools provided 3rd and 5th grade test scores for over 500 of the same children. The correlation was only 0.51! In other words, how well a child tested in 3rd grade was only a loose predictor of how they tested in the 5th grade.

Family economic status of students' classmates has an even more important impact on students' test scores than the economic status of students' own families.

There is nothing revolutionary about the findings of this study of Baltimore County schools. They have been known for a half century. 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. It was an era when mainframe computers and punch cards (then the cutting edge technology) were permitting ready analysis of vast amounts of data for the first time.

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."[12]

In 2010, two University of Wisconsin researchers re-analyzed Coleman's original data base, using a two-level hierarchical linear model (HLM), an even more sophisticated statistical tool developed since Coleman's original study.[13] Among their conclusions is that

> Formal decomposition of the variance attributable to individual background and the social composition of the schools provides very clear and compelling evidence that going to a high-poverty school or a

[12] Quoted in Richard D. Kahlenberg. *All Together Now: Creating Middle-Class Schools through Public School Choice.* Brookings Institution Press: Washington, DC. (2001), page 28. Kahlenberg's 33 pages of footnotes to chapters 3 and 4 catalogue most major studies on the effects of racial and economic school integration.

[13] Borman, G. D., & Dowling, M. (2010). Schools and Inequality: A Multilevel Analysis of Coleman′s Equality of Educational Opportunity Data. *Teachers College Record , 112* (5), 1201-1246.

highly segregated African American school has a profound effect on a student's achievement outcomes, above and beyond the effect of his or her individual poverty or minority status. Specifically, *both the racial/ethnic and social class composition of a student's school are more than 1 3/4 times more important than a student's individual race/ethnicity or social class for understanding educational outcomes* [emphasis added]. In dramatic contrast to previous analyses of the Coleman data, these findings reveal that school context effects dwarf the effects of [individual] family background.

Low-income children learn best
when integrated into middle class (i.e. low FARMS) schools

The Coleman Report first presented this finding. Forty-four years later, in 2010, Dr. Heather Schwartz published what is, to date, the definitive study of the impact of economic integration on the education of low-income students. Based on her doctoral dissertation for Columbia University, Dr. Schwartz's report for The Century Foundation summarized her detailed research into the academic performance of public housing children in the Montgomery County Public Schools.[14]

The USA's eleventh highest income county located adjacent to the northwest side of Washington D.C., Montgomery County has almost one million residents living within its 495 sq, mi. (140 sq. mi. of which are permanently protected farmland, parks, and natural areas). Over the past four decades, Montgomery County has become very diverse, evolving from a county that was 92% White and 8% minority in 1970 to a county that by 2011 was 48.4% White, 17.5% Hispanic, 17.1% Black, 14% Asian, and 3% mixed race and others.

Montgomery County is a quintessential "Big Box." There are only three modest-sized cities and a little over a dozen small towns and villages. County government itself is the general local government for over 85% of the county's population and exercises land use planning and zoning powers over more than 93% of the county's land area. As throughout Maryland, Montgomery County Public Schools (MCPS) is a unified, county-wide school district. With 154,434students in 2015-16, MCPS is the USA's 17th largest school district and one of its most highly rated.[15] It is now a majority-minority system with an elementary school enrollment that is 31%

[14] The report, "Housing Policy Is School Policy," can be accessed at http://tcf.org/publications/pdfs/housing-policy-is-school-policy-pdf/Schwartz.pdf .

[15] MCPS received a Malcolm Baldridge National Quality Award in in 2010. It reports a 90% graduation rate, 65.9% Advanced Placement participation rate, 1637 average combined SAT score for the class of 2011, and 34 National Blue Ribbon Schools (out of 200 total schools).

White, 21% African American, 28% Hispanic, 14% Asian, and 6% other with a FARMS rate of 41%. In short, at the elementary school level Montgomery County Public Schools are more racially diverse (69% minority) than Baltimore County Public Schools (57% minority) while having somewhat fewer FARMS pupils (41%) than Baltimore County (52%).

Almost at the outset of demographic transformation, the Montgomery County Council adopted the Moderately Price Dwelling Unit (MPDU) policy, the USA's first inclusionary zoning ordinance. Under the policy any new housing development of a certain minimum size (originally 50 units, now 20 units) was mandated to provide between 12.5% and 15% of its units that would be affordable for families below 65% of the county's Area Median Income (the bottom one-third of the county's income scale. Furthermore, the county-wide Housing Opportunities Commission was directed to purchase or rent one-third of the MPDUs for public housing eligible families (the bottom quarter of the income scale).

Thus, for almost four decades new housing developments have been 85% market rate, 10% affordable for low-income families, and 5% owned by the public housing authority for very low- and extremely-low income families. As a result, public housing families in Montgomery County don't live in projects but in apartments and townhouses integrated with middle- and upper-middle class neighbors throughout the county.

Dr. Schwartz secured the full cooperation of Montgomery County Public Schools and the Housing Opportunities Commission, collecting detailed information on 858 public housing children's family background, demographics of their fellow students at the classroom level, and standardized test score performance for up to seven years.

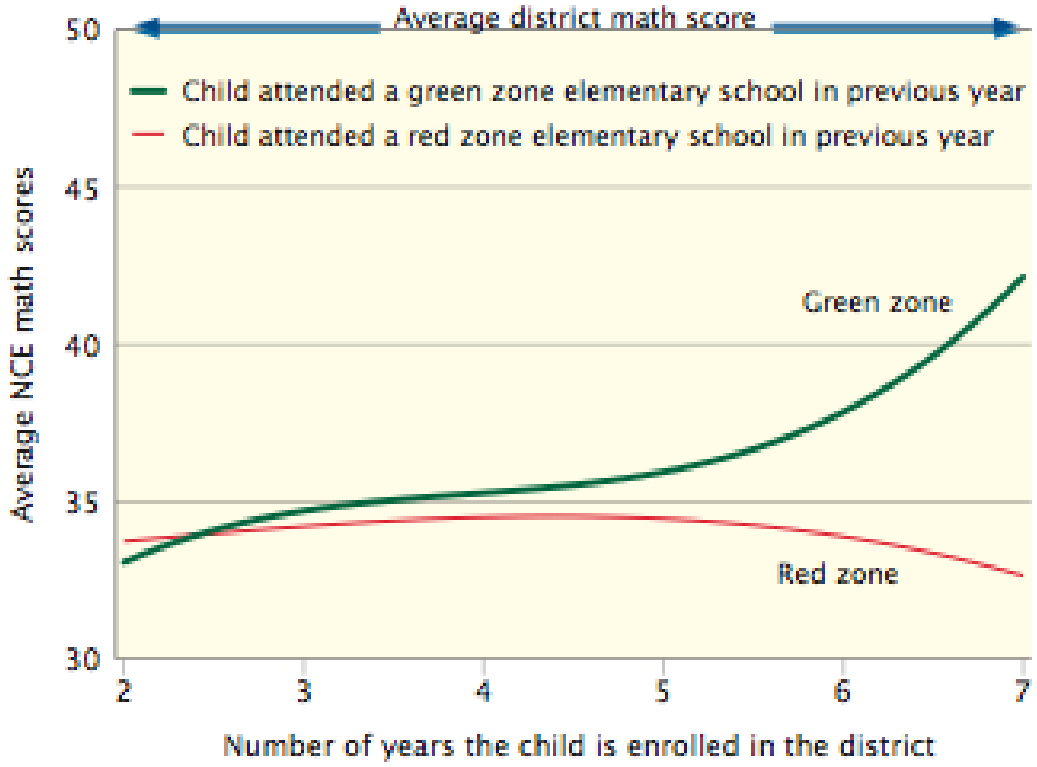
Most graphic was the demonstration of results between public housing children attending "Red Zone" schools and public housing children attending "Green Zone" schools. Several years before, MCPS leadership had recognized that many low-income children in higher FARMS schools were not being effectively educated. Though several screening measures were applied to categorize schools, in effect, schools with over 20% FARMS were classified as "Red Zone" schools. Schools with under 20% FARMS were classified as "Green Zone" schools. MCPS poured additional resources in Red Zone schools: a 20% boost in expenditures per student, full-day kindergarten, smaller class sizes in the early grades, increased teacher training, and a balanced literary curriculum.

Green Zone schools received no additional help: public housing children would simply be attending schools surrounded by a greater proportion of classmates from

higher income families with more highly educated parents than they would encounter in Red Zone schools.

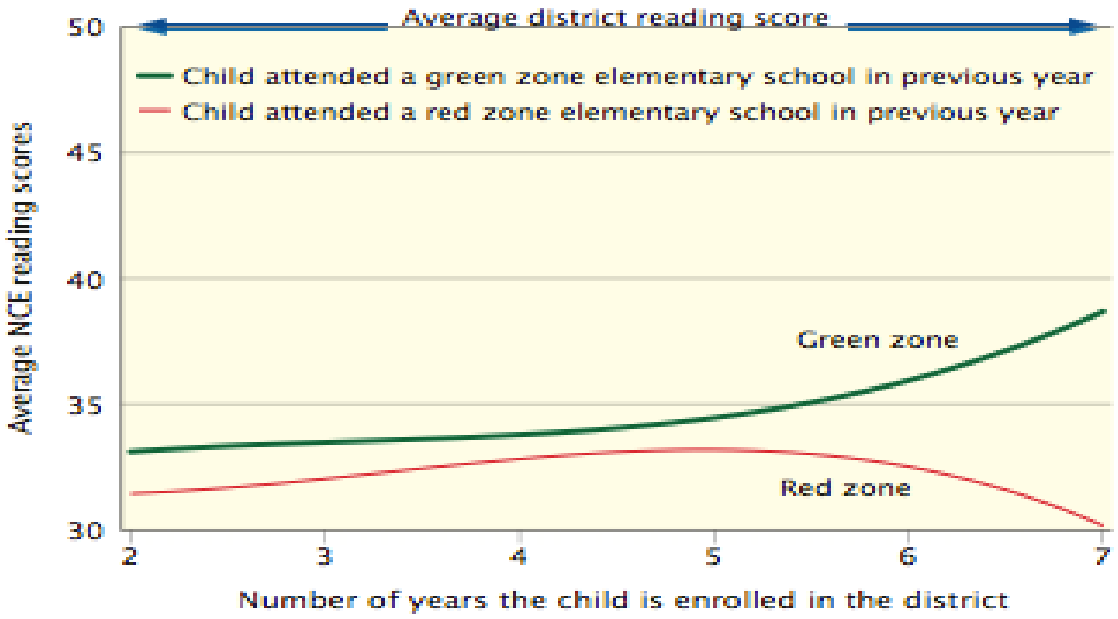
The results of Dr. Schwartz's exhaustive statistical analyses are summarized by Figures 6 and 7. After slightly closing the gap with district-wide performance levels in math and reading in the early years, as the public housing children in Red Zone schools approached their teenage years, they began falling farther and farther behind. After seven years the gaps were greater than when the public housing children in Red Zone schools began in spite of all the extra resources expended by MCPS.

Figure 6. Effect of Red Zone/Green Zone Designation on the Math Performance of Children in Public Housing



By contrast, the public housing children in Green Zone schools steadily closed the performance gaps in math and reading. In fact, as they approached their teenage years (and were presumably more influenced by peer example), their performance levels soared.

Figure 7. Effect of Red Zone/Green Zone Designation on the Reading Performance of Children in Public Housing



Dr. Schwartz summarized her findings thus:

> Although most education research attempts to quantify the effects of various promising school-based reforms for low-income children, many of which Montgomery County has embraced—for example, full-day kindergarten, smaller class sizes in early grades, a balanced literacy curriculum, increased professional development—the results from this study suggest that the efforts to enroll low-income children in low-poverty schools has proven even more powerful. Although the county's inclusionary zoning policy occurs outside the school walls, it has had a powerful educational impact, even as measured by the most demanding but perhaps most meaningful test. Namely, that over the course of elementary school, *highly disadvantaged children with access to the district's lowest-poverty neighborhoods and schools began to catch up to their non-poor, high-performing peers, while similar disadvantaged children without such access did not* [emphasis added].

Are there similar studies for Baltimore County Public Schools? Though the on-line, school-by-school report cards provide the data, I did not try to compare PARCC scores for FARMS vs. non-FARMS pupils or for Black and White pupils – the only racial groups that would be sufficiently represented in most elementary

schools (i.e. with ten or more Black or White pupils) to support meaningful analysis. Doing so would have at least tripled the amount of work.

However, both in 1998 I did such a study on Baltimore City and Baltimore County elementary schools for the Abell Foundation; in 2003 I updated and expanded that study to cover all 372 elementary school in the Baltimore area's seven school districts.[16]

First, it found virtually the same relationship between % FARMS and standardized test scores that this study of Baltimore County's 107 elementary schools found 13 years later.

> **There is a very high correlation between socioeconomic status and academic achievement;** ***a school's percentage of FARM pupils explained 81 percent*** [i.e. 0.81] ***of the school-by-school variation in CTBS results.*** In layman's terms, knowing the percentage of FARM pupils, one can predict a school's CTBS score and fall within 7.5 percentiles of the actual score about 95 percent of the time. On average, every one percent change in the proportion of FARM vs. non-FARM students changes the school's median composite CTBS scores by 0.48 percentile. As the proportion of FARM pupils increases, for example, a school's median CTBS score goes down. [The correlation between % FARMS and % PARCC passing rates is 0.835 in the current study.]

Second, the 2003 study (as did the 1998 study) did show similar results for Baltimore area schools as Dr. Schwartz's study (though I was using less rigorous statistical methods and without benefit of a Columbia University doctoral dissertation panel critiquing my work).

> **There is a powerful, statistically significant relationship between test scores of low income pupils and the percentage of classmates that are middle class.** For every one percent increase in middle class classmates, a low income pupil's scores will improve, on average, 0.18 percentiles. FARM pupils in 90-100 percent FARM schools averaged in the 31st percentile in their CTBS test battery. (FARM Pupils in a subset of six schools that were almost totally FARM eligible averaged in the 24th percentile.) FARM pupils in 90-100 percent middle class (that is, non-FARM) schools averaged in the 48th percentile.

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[16] This later report, "Housing Policy Is School Policy: an Analysis of the Interaction of Housing Patterns, School Enrollments, and Academic Achievement in the Baltimore Area Public Schools" (June, 2003)," is summarized in an on-line Abell Report that can be accessed at http://www.abell.org/sites/default/files/publications/arn903.pdf.

Third, my 2003 examined a question that the current report does not: what happens to test scores of non-FARMS pupils as the percentage of FARMS pupils increases? Is there an adverse effect on middle-class pupils?

The answer is "no" … and "sort of." *The uncertainty revolves around the fact that it is not the same "middle class" in different schools with different FARMS levels.* School data divides the world into just two economic groups – FARMS and non-FARMS (sometimes three groups if the data differentiate between free meal and reduced-price meal pupils, which Maryland data do not). However, in the Baltimore area, for example, FARMS eligibility covers only about the lowest 25 percentiles of the family income range. There's a big difference between the average test scores of a "non-FARMS/middle class" pupil from a 30th income percentile family and a "non-FARMS/middle class" pupil from a 90th income percentile family.

For the 2003 study I identified 33 elementary schools in Baltimore suburbs whose names and presumably whose attendance zones most closely matched Census-Designated Places (CDPs). The Baltimore County CDPs/schools were Dundalk, Lansdowne, Randallstown, and Owings Mills (higher FARMS), Arbutus, Essex, Reistertown, Catonsville, Carney, and Perry Hall (lower FARMS) and Timonium (very low FARMS). Examining census data on family incomes, parental educational attainment and occupations, I designated schools with 90%-100% non-FARMS as "designer clothes" schools (i.e. largely children of professionals, business executives and owners, etc.); 70%-89.9% non-FARMS as "white/pink collar" schools; and 40%-69.9% non-FARMS as "blue collar" schools. The academic findings were[17]

> **There is clear and striking socioeconomic segmentation of the Baltimore region's middle class.** There were 101 "designer clothes" schools – all in the city's suburbs. There were another 100 "white/pink collar" schools – all but one (Mount Washington: 71.5% non-FARM) located in the suburbs. There were 78 "blue collar" schools. These were also overwhelmingly suburban schools.
>
> The relationship of class and achievement appears to be somewhat discontinuous and curved rather than a steady linear relationship. Middle class (non-FARM) pupils in "designer clothes" schools (90-100 percent non-FARM) averaged in the 72nd percentile in their CTBS test battery. Scores remained relatively high (albeit lower) for the next two deciles of heavily middle class, "white/pink collar" schools.

[17] More detailed information is provided in Appendices C-1 and C-2.

> Achievement levels of non-FARM pupils in "blue collar" schools (that is, between 40 percent and 69.9 percent non-FARM classmates), dropped sharply downward from 64.5 percentile to 57.4 percentile. Thereafter, scores hit a plateau in the mid-50s before beginning to drop sharply again after the school became 60 percent or more FARM pupils ("medium poverty schools"). In "high poverty" schools, non-FARM scores plummeted.
>
> By comparison, the slight differentiation among low income pupils did not seem to explain the significant improvement in their test scores as the socioeconomic environment of their schools improved.

The bottom line: "middle class" pupils' test scores and other measures of academic achievement will be unaffected by modest increases in the proportion of FARMS classmates as long as a stable "middle class" enrollment of the same characteristics as before is maintained. If the nature of a school's "middle class" changes (for example, from "white/pink collar" to "blue collar"), there will be a corresponding decline in "middle class" test scores that has very little to do with what is actually happening within more economically diverse classrooms.

Concluding Thoughts

Earlier, I described Montgomery County as "a quintessential 'Big Box.'" Actually, Baltimore County is *the* quintessential "Big Box." With 823,015 residents (2013 estimate), Baltimore County is the most populous county in the USA without a single municipality (free-standing county, that is, excluding the five constituent counties that compose New York City). That means that there is just one elected local general government, Baltimore County, governed by its elected county executive and seven county council members. The county council is the final planning and zoning authority for all 599 square miles (except for federally- and state-owned land). So, over the decades, housing patterns that underlie school enrollment patterns in Baltimore County can be laid directly at the feet of past and present county planning commissions and county councils.

Some may argue that local government really just responds to proposals from private, for-profit developers. And, indeed, local governing bodies can be overly developer-friendly (in part, because of the influence major campaign contributions from the development community often play). However, the National Association of Home Builders (NAHB) once stated that "[a]ttacking past development patterns and blaming builders [for urban sprawl] does not recognize the fact that *public policy dictates where development occurs* [emphasis added]."[18]

[18] https://www.nahb.org/en/research/~/media/684698D1540E451C93581FECE28E0321.ashx (page 4)

Acknowledging that what's past is past, the Baltimore County Council can still take a more active role in fostering more racially and economically diverse communities and schools, such as

- enacting the HOME Act, banning source of income discrimination for rental properties as Howard and Montgomery counties have done;
- enacting a comprehensive inclusionary zoning ordinance as Montgomery and Frederick counties and, in a more limited fashion, Howard County have done to increase the building of more affordable housing within mixed-income, predominantly market-rate, new developments;
- directing the Baltimore County Housing Office (responsible for most HCV concentration in certain neighborhoods) to cease placing Housing Choice Voucher families with children in apartments served by elementary schools with higher FARMS enrollments (for example, those above 60% FARMS, which would be about one-third of the county elementary schools);[19] and
- review county land use planning and zoning codes and adopt provisions (e.g. reducing minimum lot sizes and set-back requirements, etc.) that encourage more mixed-income development to strengthen what can be achieved through a mandatory inclusionary zoning ordinance.

Moreover, though Baltimore County Public Schools is formally governed by a 13-member Board of Education (whose members are appointed by the governor), county government exercises substantial budgetary control.[20] It is county government that must ultimately approve the annual school budget, approve the

[19] Such a policy might contain an appeal mechanism, triggered by the household head, to use an HCV in an otherwise "non-opportunity" neighborhood because of special circumstances, such as location close to work, near a relative (for child care), or maintaining children's enrollment in the local school, etc.

[20] According to the school board's website, each year the Board approves a budget designed to finance the county public school program. The budget is based upon the goals and policies of the Board, is developed by the Superintendent and other appropriate school personnel, and is considered and adopted by the Board. The three major divisions of the budget are current annual expenses, capital outlay, and debt incurred for previous school construction. Upon adoption by the Board, the budget is submitted to the County Executive for review, adjustment, and adoption. The recommendations of the County Executive are then submitted to the County Council, which may approve or reduce (but not increase) the budget. The county government is authorized by the county charter to appropriate tax revenues for the support of the school budget. Additional revenues are available through the funding of bonds and through state appropriations, and miscellaneous fees. However, the outstanding majority of budgeted school money is derived from county taxes.

holding and ballot measures for school bond elections,[21] and levy the taxes to support the county's public schools. School issues are a central concern of the Baltimore County Council to an unusual degree in the United States.[22]

Most educators will express a sincere conviction that they can succeed in educating any child regardless of the child's circumstances. And as parents and taxpayers, we want them to be motivated by such beliefs in order to make the maximum effort with every child.

But almost all independent researchers, many educators, and, indeed, many parents (at least, with regard to schools in which they seek to send their own children) recognize that there are environments with which most children (and their teachers) will succeed and other environments in which most children (and their teachers) will fail.

Nonetheless, most educators and most politicians will not deal with the heart of the problem: the racial and economic segregation of neighborhoods that underlie the racial and economic segregation of neighborhood schools.

Instead, they seek school-based solutions that avoid the challenge. The demand is for more money … or more teacher accountability … or more community-based governance … or the latest technological or pedagogical "silver bullet" … etc. … anything but struggling for more integrated schools.

Too few will embrace what educational research (including this study) constantly demonstrates.

Housing Policy Is School Policy.

[21] Under state law only Baltimore City and Baltimore County can hold school bond elections. In Maryland's other 22 county, issuance of school bonds are approved directly by the Board of County Commissioners.

[22] About 88% of all elementary, secondary and post-secondary school districts in the USA are completely independent of municipal and county governments.

A-1 ELEMENTARY SCHOOLS IN COUNCIL DISTRICT 1

elementary school in 2015-16	pct FARMS 1994-95	pct FARMS in 2004-05	pct FARMS in 2015-16	PARCC English/math met/exceeded expectations in 2015-16	relative ranking battery in 2015-16 1=highest 104=lowest
Westchester	na	13%	25%	48%	27
Hillcrest	10%	15%	25%	58%	13
Catonsville	11%	20%	34%	53%	20
Relay	13%	24%	37%	41%	34
Westowne	25%	28%	46%	45%	33
Woodbridge	11%	22%	53%	38%	41
Arbutus	27%	23%	54%	31%	57
Halethorpe	21%	36%	67%	37%	44
Dogwood	na	55%	68%	27%	65
Edmondson Heights	27%	60%	72%	7%	104
Chadwick	42%	62%	75%	46%	29
Lansdowne	31%	57%	77%	22%	80
Johnnycake	35%	52%	79%	20%	86
Baltimore Highlands	52%	65%	87%	18%	91
Riverview	67%	82%	90%	16%	95
District 1 average (unweighted)	**29%**	**41%**	**59%**	**34%**	

NOTE: Westchester was established in 1998 and Dogwood in 2000.

A-2 ELEMENTARY SCHOOLS IN COUNCIL DISTRICT 2

elementary school in 2015-16	pct FARMS 1994-95	pct FARMS in 2004-05	pct FARMS in 2015-16	PARCC English/math met/exceeded expectations in 2015-16	relative ranking battery in 2015-16 1=highest 104=lowest
Riderwood	2%	5%	5%	73%	1
Fort Garrison	2%	5%	10%	53%	22
Summit Park	3%	12%	12%	66%	7
Chatsworth	15%	18%	23%	46%	31
Franklin	7%	11%	26%	56%	16
Wellwood International	19%	29%	41%	38%	42
Woodholme	na	*34%*	49%	39%	38
Glyndon	15%	26%	55%	31%	56
Cedarmere	25%	26%	55%	34%	52
Timber Grove	21%	31%	56%	33%	55
Reisterstown	18%	21%	57%	23%	73
Winand	22%	39%	61%	38%	39
Bedford	28%	46%	73%	23%	77
Milbrook	32%	49%	75%	24%	71
District 2 average (unweighted)	**16%**	**25%**	**43%**	**41%**	

NOTE 1: 5% means 5% or less
NOTE 2: Woodholme was established in 2005.

A-3 ELEMENTARY SCHOOLS IN COUNCIL DISTRICT 3

elementary school in 2015-16	pct FARMS 1994-95	pct FARMS in 2004-05	pct FARMS in 2015-16	PARCC English/math met/exceeded expectations in 2015-16	relative ranking battery in 2015-16 1=highest 104=lowest
Sparks	4%	5%	5%	65%	8
Jacksonville	3%	5%	6%	70%	2
Carroll Manor	3%	5%	7%	68%	3
Prettyboy	5%	5%	7%	53%	21
Pinewood	1%	5%	8%	66%	6
Seventh District	7%	7%	9%	60%	11
Timonium	7%	5%	11%	68%	4
Fifth District	5%	5%	13%	67%	5
Lutherville Laboratory	5%	8%	16%	60%	10
Hampton	9%	12%	19%	46%	30
Mays Chapel	na	na	29%	50%	23
Pine Grove	4%	18%	37%	54%	19
Warren	11%	19%	44%	40%	36
Pot Spring	11%	17%	47%	34%	50
Padonia International	22%	27%	63%	28%	60
District 3 average (unweighted)	**7%**	**12%**	**23%**	**54%**	

NOTE 1: 5% means 5% or less

NOTE 2: Mays Chapel was established in 2014

A-4 ELEMENTARY SCHOOLS IN COUNCIL DISTRICT 4

elementary school in 2015-16	pct FARMS 1994-95	pct FARMS in 2004-05	pct FARMS in 2015-16	PARCC English/math met/exceeded expectations in 2015-16	relative ranking battery in 2015-16 1=highest 104=lowest
New Town	na	20%	34%	40%	37
Deer Park	26%	39%	62%	28%	62
Hernwood	26%	44%	65%	25%	68
Church Lane Technology	25%	42%	67%	28%	63
Randallstown	42%	43%	68%	27%	64
Powhatan	43%	56%	70%	23%	74
Hebbville	46%	52%	71%	20%	85
Featherbed Lane	55%	53%	73%	23%	75
Winfield	55%	55%	73%	19%	88
Owings Mills	50%	47%	74%	24%	72
Scotts Branch	56%	66%	78%	16%	96
Woodmoor	54%	62%	79%	21%	84
District 4 average (unweighted)	**43%**	**48%**	**68%**	**24%**	

NOTE: New Town was established in 2001.

A-5 ELEMENTARY SCHOOLS IN COUNCIL DISTRICT 5

elementary school in 2015-16	pct FARMS 1994-95	pct FARMS in 2004-05	pct FARMS in 2015-16	PARCC English/math met/exceeded expectations in 2015-16	relative ranking battery in 2015-16 1=highest 104=lowest
Rodgers Forge	5%	5%	5%	55%	17
West Towson	na	na	5%	64%	9
Chapel Hill	18%	12%	10%	57%	14
Kingsville	6%	6%	12%	58%	12
Stoneleigh	6%	12%	15%	56%	15
Cromwell Valley Magnet	13%	10%	19%	55%	18
Gunpowder	5%	14%	26%	48%	28
Seven Oaks	4%	8%	27%	49%	25
Joppa View	7%	11%	34%	36%	46
Fullerton	11%	18%	39%	50%	24
Perry Hall	8%	17%	39%	36%	47
Carney	12%	17%	48%	33%	54
Harford Hills	17%	28%	48%	45%	32
Oakleigh	17%	35%	55%	23%	78
District 5 average (unweighted)	**10%**	**15%**	**27%**	**48%**	

NOTE 1: 5% means 5% or less
NOTE 2: West Towson was established in 2010.

A-6 ELEMENTARY SCHOOLS IN COUNCIL DISTRICT 6

elementary school in 2015-16	pct FARMS 1994-95	pct FARMS in 2004-05	pct FARMS in 2015-16	PARCC English/math met/exceeded expectations in 2015-16	relative ranking battery in 2015-16 1=highest 104=lowest
Oliver Beach	23%	17%	26%	38%	40
Vincent Farm	na	35%	35%	49%	26
Villa Cresta	12%	23%	43%	35%	49
Orems	14%	25%	54%	28%	61
Seneca	40%	50%	60%	26%	67
Red House Run	14%	36%	64%	36%	45
Chase	46%	73%	65%	13%	101
Pleasant Plains	20%	42%	67%	24%	70
Victory Villa	39%	54%	68%	38%	43
McCormick	45%	65%	69%	14%	99
Elmwood	44%	44%	73%	17%	92
Glenmar	49%	68%	75%	16%	93
Shady Spring	40%	57%	78%	27%	66
Martin Boulevard	48%	60%	79%	21%	83
Halstead Academy	67%	69%	79%	14%	100
Hawthorne	60%	60%	80%	16%	94
District 6 average (unweighted)	**37%**	**49%**	**63%**	**26%**	

NOTE: Vincent Farm was established in 2008.

A-7 ELEMENTARY SCHOOLS IN COUNCIL DISTRICT 7

elementary school in 2015-16	pct FARMS 1994-95	pct FARMS in 2004-05	pct FARMS in 2015-16	PARCC English/math met/exceeded expectations in 2015-16	relative ranking battery in 2015-16 1=highest 104=lowest
Edgemere	34%	28%	44%	35%	48
Middleborough	25%	24%	45%	34%	53
Chesapeake Terrace	22%	31%	47%	29%	58
Essex	29%	28%	61%	23%	79
Grange	36%	36%	62%	34%	51
Bear Creek	26%	37%	67%	19%	89
Battle Grove	36%	46%	71%	18%	90
Charlesmont	38%	48%	72%	28%	59
Berkshire	35%	56%	76%	40%	35
Sandy Plains	55%	67%	78%	15%	97
Middlesex	68%	55%	79%	19%	87
Mars Estates	63%	74%	79%	15%	98
Dundalk	51%	67%	79%	22%	82
Sussex	49%	66%	80%	23%	76
Logan	53%	69%	82%	24%	69
Colgate	31%	65%	86%	13%	102
Sandalwood	73%	75%	87%	22%	81
Deep Creek	78%	77%	92%	9%	103
Norwood	34%	50%	76%	na	na
District 7 average (unweighted)	**44%**	**53%**	**72%**	**24%**	

NOTE: Norwood tested only for 3rd grade in 2015-16.

APPENDIX B

Summary of Regressions for 107 County Elementary Schools

1. Single-variable Linear Regressions

Input	R-Squared	t-stat
% FARMS pupils	0.835	- 22.22***
% mobility (classroom turnover)	0.581	- 11.897***
% Advanced Professional teachers	0.399	+ 8.23***
% White pupils	0.386	+ 8.00***
% Black pupils	0.341	- 7.27***
% Hispanic pupils	0.149	- 4.22***
% special education pupils	0.141	- 4.09***
% Asian pupils	0.091	+ 3.19***
Pupil-teacher ratio	0.010	+ 0.0095#
% classes taught by *not* highly qualified teachers	0.005	+ 0.0070#

**** = 99% confidence factor (threshold: t-stat = 2.57)*
*** = 95% confidence factor (threshold: t-stat = 1.96*
** =90% confidence factor (threshold: t-stat = 1.64)*
 # = not statistically significant

2. Multi-Variable Linear Regression

Input	R-Squared	t-stat
All ten inputs collectively	0.854	na
% FARMS pupils	---	- 8.89***
% Black pupils	---	+ 0.62
% Hispanic pupils	---	+ 0.75
% Asian pupils	---	+ 1.39
% White pupils	---	+ 0.71
% mobility (classroom turnover)	---	+ 0.89
% special education pupils	---	- 0.71
% classes taught by *not* highly qualified teachers	---	- 0.51
Pupil-teacher ratio	---	- 0.18

Free Meal percent is totally dominant at 99% confidence level. All other inputs are not statistically significant though % Asian pupils and % Advanced Professional teachers begin to approach threshold of statistical significance.

C-1 The Different "Middle Classes"/Non-FARM Suburban Families (2003 report)

Characteristics of attendance zones of 33 elementary schools in suburban Baltimore from Census 2000

	more than 30% FARM (7)	10% to 30% FARM (16)	less than 10% FARM (10)
average FARM enrollment	50%	16%	6%
educational attainment:			
high school or less	54%	49%	36%
college graduate or more	19%	23%	37%
occupation:			
manager or professional	30%	35%	44%
median family income	$52,767	$58,158	$74.254
more than $35,000	70%	77%	87%
family income classes:			
$35,000 to $49,999	25%	23%	15%
$50,000 to $99,999	60%	60%	53%
more than $100,000	15%	17%	32%

C-2 Test Scores of Different "Middle Class" Pupils in Metro Baltimore

Middle class (non-FARM) pupils in "designer clothes" schools (90-100 percent non-FARM) averaged in the 72nd percentile in their CTBS test battery. Scores remained relatively high (albeit lower) for the next two deciles of heavily middle class, "white/pink collar" schools.

Distribution of CTBS median percentiles for non-FARM pupils by deciles of percentage of non-FARM pupils in 337 elementary schools in 2001 and 2002

pct of FARM or pct of non-FARM	number of schools	mean of non-FARM median percentiles
designer clothes schools		
90-100% non-FARM	101	71.6
white/pink collar schools		
80-89.9% non-FARM	53	66.6
70-79.9% non-FARM	47	64.5
blue collar schools		
60-69.9% non-FARM	18	57.4
50-*59.9% non-FARM*	*19*	*56.4*
40-49.9% non-FARM/50.0-59.9% FARM	*26*	*56.2*
medium poverty schools		
60.0-69.9% FARM	15	51.9
high poverty schools		
70-79.9% FARM	22	45.1
80-89.9% FARM	27	42.0
90-100% FARM	45	37.0
[95-100% FARM]	[6]	[25.5]

Achievement levels of non-FARM pupils in "blue collar" schools (that is, between 30 percent and 50 percent non-FARM classmates), dropped sharply downward from 64.5 percentile to 57.4 percentile. Thereafter, scores hit a plateau in the mid-50s before beginning to drop sharply again after the school became 60 percent or more FARM pupils ("medium poverty schools"). In "high poverty" schools, non-FARM scores plummeted.